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Oil and Gas Developments in Pennsylvania in 1970

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TOPOGRAPHIC AND GEOLOGIC SURVEY
Arthur A. Socolow, State Geologist

Progress Report 183

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Oil and Gas Developments in Pennsylvania in 1970

by

William S. Lytle, Louis Heyman and Dana R. Kelley

ABSTRACT

Oil and gas activities in the Commonwealth in 1970 continued the long-term trends of prior years. Oil well drilling has been generally stable, or even slightly increased, yet there has been a decrease in both production and reserves of oil. Gas well drilling has decreased while gas production has remained stable and gas reserves have increased slightly.

Shallow well completions with potentials in excess of 50 BOPD and/or 2 MMCFGPD decreased from 72 in 1969 to 59 in 1970, and in percentage of all wells reported, from 6.1 percent (revised figure) to 5.8 percent. Activity in the west central Pennsylvania Upper Devonian pre-Speechley gas development reported last year decreased considerably, whereas activity increased in the northwestern Pennsylvania Glade Sandstone area, with highlight completions increasing from 37 in 1969 to 45 in 1970. Development in the old Venango Sandstone area held steady. A revival of activity was reported in the Big Shanty area of McKean County, where three highlight wells were reported completed from the Bradford Second sand. The production history of some highlight completions first reported in 1968 is given in a set of production curves.

Two deep development highlight wells, with potentials of about 10 MMCF or more, and four deep wildcat discoveries were reported in 1970. One wildcat was completed as an Onondaga Chert-Oriskany Sandstone gas discovery inside the so-called "no Oriskany Sandstone" area in Armstrong County.

Oil wells completed in 1970 decreased 20 percent, Pennsylvania Grade oil production decreased 10 percent and Pennsylvania Grade reserves declined 7 percent to 50,790,000 barrels. Corning grade crude production increased 44 percent but reserves of this grade declined 12 percent to 493,000 barrels.

Gas wells completed in 1970 increased 2 percent, production decreased 2 percent, but reserves of gas increased 6 percent to 1,377,502 MMCF. Gas storage capacity increased to 710,038 MMCF, and stored gas reserves increased to 587,959 MMCF, an increase of 17 percent.

Other wells completed, including secondary recovery, storage, stratigraphic and old well workovers increased 3 percent in 1970.

Total of all wells reported in 1970 was down by 161 wells, or 14 percent below 1969.

Of the 725 primary wells reported, 41 were exploratory and 684 development. This is a 2 percent decrease in exploratory wells and a 20 percent decrease in development wells from 1969. However, exploratory completions were 58 percent successful, an increase of 87 percent over 1969, and development completions were 99 percent successful, an increase of 4 percent over 1969.

Exploratory and development footage was down 14 percent from 1969, but the average depth of all wells drilled was 1991 feet, 122 feet deeper than in 1969.

Secondary and tertiary recovery projects continued at a steady pace in 1970. The Maraflood pilot project in the Bradford Field, McKean County, was expanded and another Maraflood project in the Venango Sandstone was started in Warren County.

A Pennsylvania Geological Survey study of subsurface waste disposal principles and potential in Pennsylvania was completed and is expected to be published in 1971-72. Gamma-ray correlation sections of the surface to Middle Devonian and Middle Devonian to uppermost Ordovician subsurface rocks in western and central Pennsylvania are continuing; the first results are expected to be published in 1971-72.

INTRODUCTION

The generalized stratigraphic columns formerly presented in the annual oil and gas development reports have been superseded by Progress Report 178, Representative Gamma-ray Logs from Shallow and Deep Wells, Western Pennsylvania. This publication contains three shallow gamma-ray logs (two from the oil belt and one from the gas fields), and one deep gamma-ray log on which shallow and deep producing intervals have been designated.

Part I of this annual report draws attention to good completions in the Commonwealth in 1970 or wells of special note for other reasons. Part II contains the statistics and review of industry activities for the year, and Part III is the summarized records of 1969 deep wells.

ACKNOWLEDGMENTS

The writers acknowledge the cooperation of the Bradford District Producers Association, the Office of the Deputy Secretary-Oil and Gas, and the Pennsylvania Bureau of Forestry—the Department of Environmental Resources, the Pennsylvania Game Commission, and the Petroleum Information Corporation in the preparation of this report.

Appreciation is extended to operators and companies who released data on highlight well completions.

PART I. COMPLETION HIGHLIGHTS FOR 1970

SHALLOW HIGHLIGHTS

As established in Progress Report 177, the lower limits used in considering a shallow well (Upper Devonian or Mississippian) as a highlight well are an initial potential over 50 BOPD and/or over 2 MMCFGPD.

Only 59 shallow highlight wells were reported in 1970. This decrease from the 72 reported in 1969 was primarily due to a substantial decrease in lower Zone B drilling activity. The highlight wells composed 5.8 percent of the total wells reported. Table 1 gives highlight well statistics.

Table 1. Shallow highlight well statistics

	1970			1969		
Fields with Highlight wells	12			20		
Counties with Highlight wells	6			8		
Producing Zones	*Gas*	*Oil*	*Total*	*Gas*	*Oil*	*Total*
Pre-Speechley (Zone B*)	8	0	8	19	7	26
Speechley (Zone B*)	0	45	45	0	37	37
Pink Rock (Zone C*)	0	0	0	1	0	1
Zone D* and Mississippian	0	6	6	0	8	8
Totals	8	51	59	20	52	72

* Zones of Upper Devonian rocks established in Progress Report 178.

Figure 1 shows the distribution of the shallow highlight wells. The following is a brief description of those highlight occurrences about which information was released. Unfortunately, data beyond that submitted for Division of Mines and Mineral Industries well records could not be acquired for some highlight wells and areas not discussed further.

Pre-Speechley Gas Development, West Central Pennsylvania

The pre-Speechley (Upper Devonian Zone B) gas play in the west central part of the state (see Progress Report 181 for 1969 and Progress Report 177 for 1968, for previous discussions) experienced a tapering off of development activities in 1970. Five highlight wells with potentials of 2.0 to 2.8 MMCFGPD were completed in Indiana County from this zone, and 2 highlight wells with potentials of 2.1 and 2.7 MMCFGPD were completed in Jefferson County from this zone. No highlight gas wells from this zone were reported from other counties.

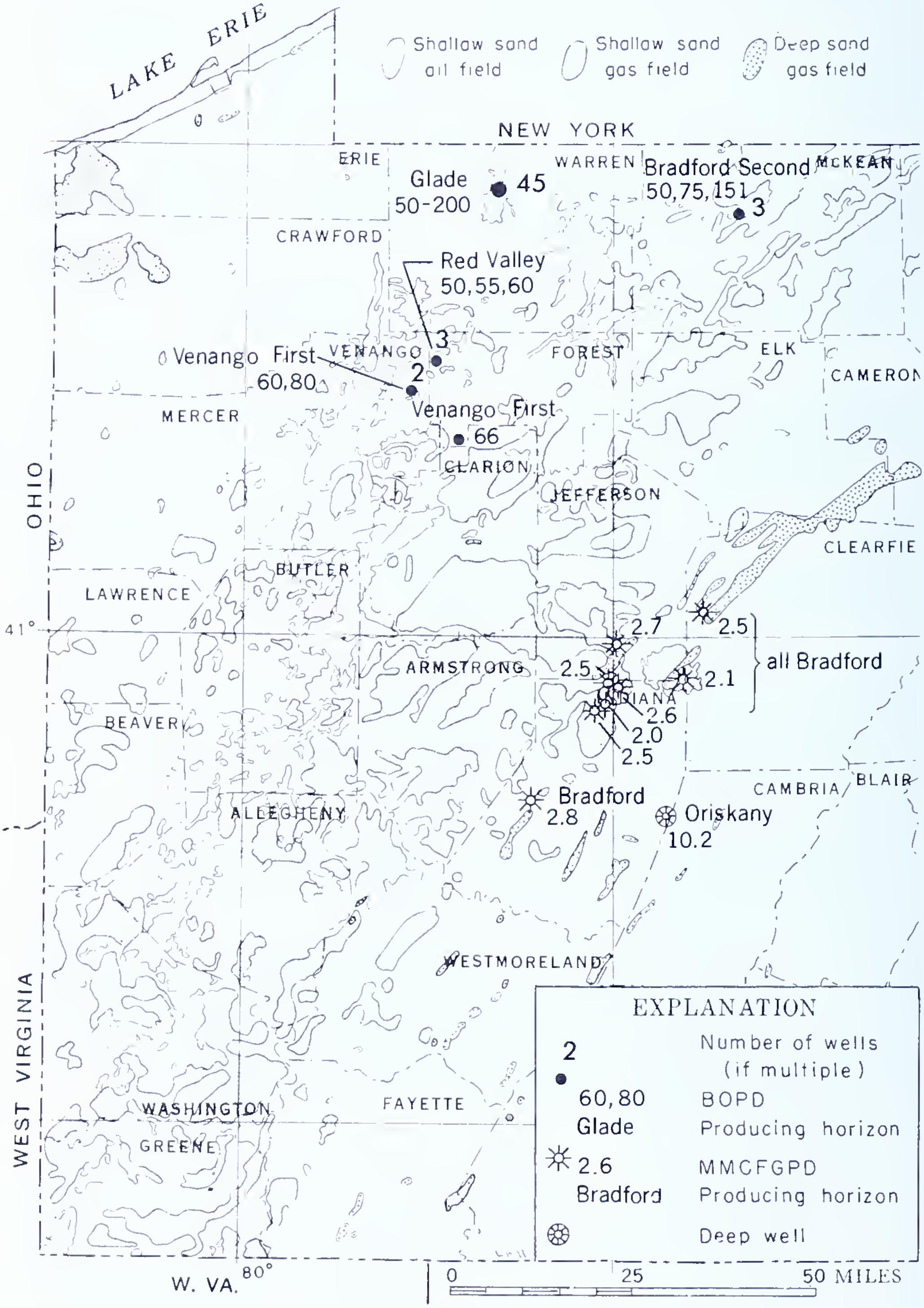


Figure 1. Highlight wells reported in 1970

Glade Sandstone Oil Development, North Central Warren County

The development of oil production from the Glade and related (Clarendon, Gartland) sandstones of Upper Devonian Zone B in the Youngsville-Sugar Grove area of north central Warren County increased slightly in 1970. Forty-five wells with initial potentials of 50 to 200 BOPD from this zone were reported.

Venango Sandstone Oil Development, Forest and Venango Counties

Oil development in the old Venango sandstone (Upper Devonian Zone D) fields in Forest and Venango Counties continued at a steady pace. In Forest County, four highlight wells were reported. One well had a potential of 66 BOPD from the Venango First sandstone and three wells were completed producing 50 to 60 BOPD from the Red Valley sandstone. In Venango County, two highlight wells, one producing 60 BOPD and the other 80 BOPD were reported completed from the Venango First sandstone.

Murrysville Sandstone Gas Development, Westmoreland County

An excellent gas well with an initial potential of 6.3 MMCFGPD natural was completed from the Murrysville (Mississippian) sandstone in Westmoreland County in 1969 (see Progress Report 181). However, there is at present no activity in the area. One dry hole was drilled in the vicinity in 1970.

Bradford Second Sand Oil Development, Big Shanty Area, McKean County

The Big Shanty area, Lafayette Township, McKean County, had an upsurge of new oil production from the Bradford Second sand (Upper Devonian Zone B) in 1970. This development was highlighted by the completion of Quaker State's #32 Big Shanty well for 151 BOPD, their #42 well for 72 BOPD and their #44 for 50 BOPD.

The Big Shanty area originally had been tested by several wells drilled to 1800-1900 feet, testing the Bradford Third or Lewis Run sands. These wells had been plugged and abandoned. Some have subsequently been reopened, cleaned out to a plugback total depth of about 1700 feet and completed by open-hole sand-fluid fracture treatment of the Bradford Second sand. Other new wells are being drilled and similarly completed in this zone. Due to plentiful gas in the pay zone, many of the wells are completed flowing. Quaker State, the operator in this area, is developing the tract on a waterflood pattern. They expect to start a waterflood as soon as primary production has completed its decline. Figure 2 shows the location of the Big Shanty area and a geophysical log of the Bradford Second sand section in one of the highlight wells in this area.

DEEP HIGHLIGHTS

The general lower limit for deep highlight wells is 10 MMCFGPD.

Extension of Area Prospective for Oriskany Gas Armstrong and Indiana Counties

Although not a highlight well, strictly speaking, the Peoples Natural Gas et. al #1 Nellie C. Martin, Rural Valley E-4 (map number 37), Wayne Township, Armstrong County, is noteworthy as a deep wildcat discovery with major implications. The well is an Onondaga-Oriskany gas discovery which opened the Snyderville pool, Goheenville field. It was originally drilled to total depth 15,574 feet, bottoming in the Cambrian Elbrook Formation. The well tested the Cambrian Gatesburg sandstone and Cambro-Ordovician carbonate rocks which produce gas in eastern Ohio, and the Lower Silurian Medina-Tuscarora section which produces gas and oil in northwestern Pennsylvania and gas in southwestern Pennsylvania. The well apparently found non-commercial gas shows in deeper zones, but was plugged back to 6,850 feet and completed from the Onondaga Chert and Oriskany Sandstone for an after-frac potential of 1.1 MMCFGPD.

This discovery is important because the well penetrated nine feet of Oriskany Sandstone within the so-called "Oriskany Sandstone Probably Absent" area of previously published studies. It is also located less than 2,000 feet southeast of a dry hole which had encountered no Oriskany Sandstone at the expected horizon.

This discovery may add as much as 130 square miles to the area previously recognized as underlain by Oriskany Sandstone and therefore prospective for gas, as shown in Figure 3.

In addition, another area of apparently isolated Oriskany Sandstone gas production previously had been discovered well within the "Sandstone Probably Absent" limits, in northern Clarion quadrangle, Clarion County. These two occurrences of Oriskany Sandstone necessitate rethinking of the sedimentological-stratigraphic assumptions on which the concept of a large continuous "No Oriskany Sand" area is based.

Deep Development Highlight Wells

Two deep highlight wells were reported in 1970. In Cambria County, Peoples Natural Gas completed their 1-4635 G. H. Sloan well in the

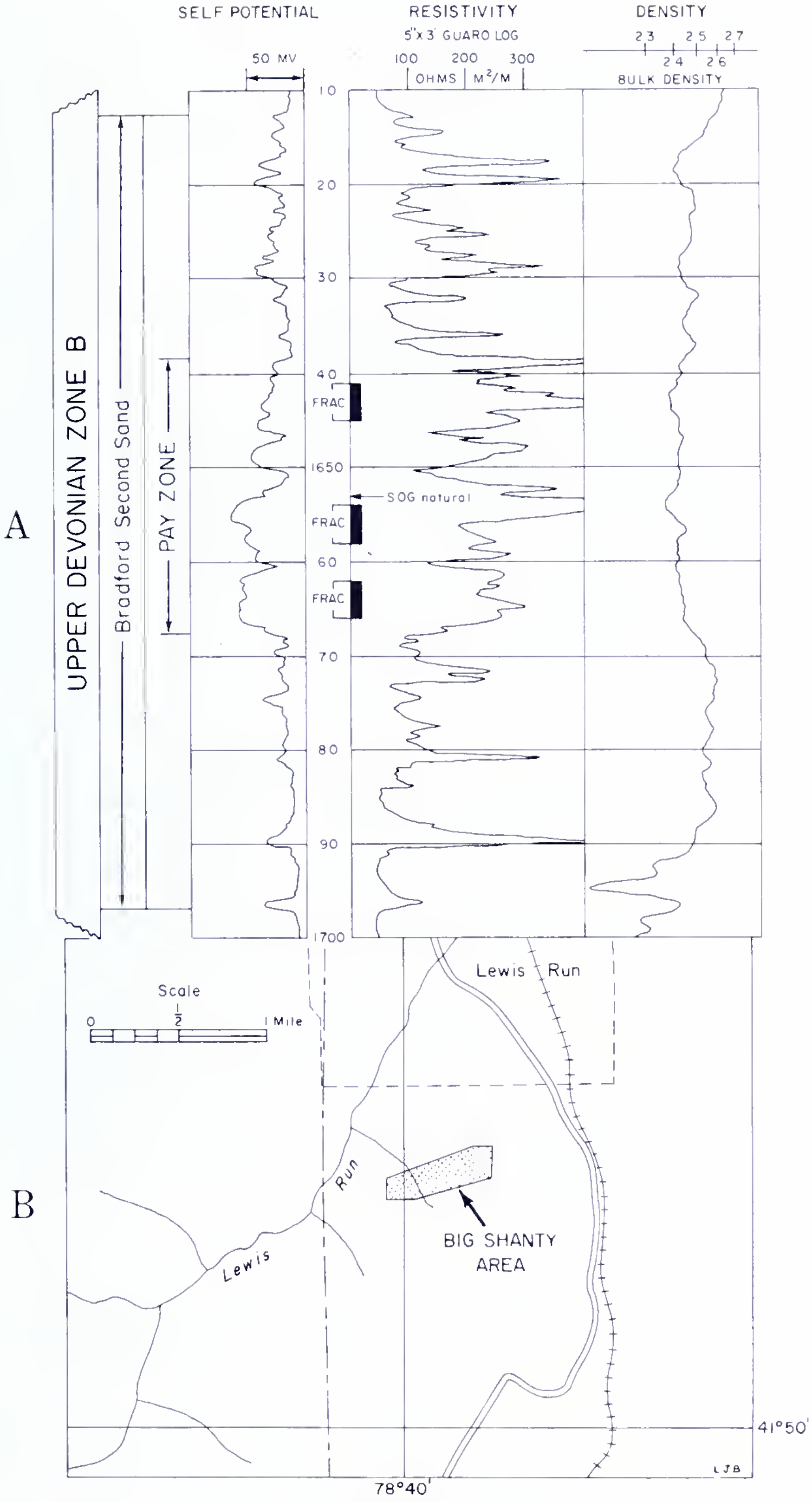
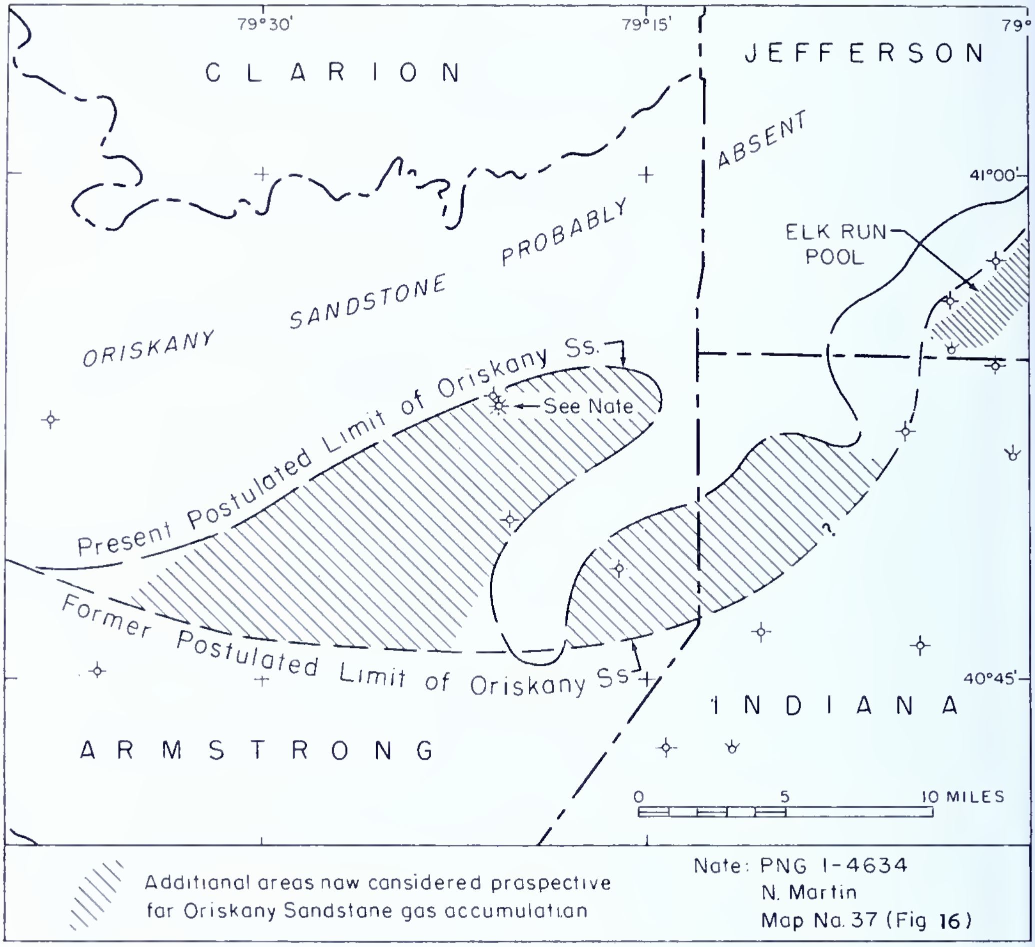


Figure 2. Log of Typical Big Shanty Producing Zone


79°30'
79°15'
79°
CLARION
JEFFERSON
ABSENT
41°00'
ELK RUN POOL
PROBABLY
SANDSTONE
ORISKANY
Present Postulated Limit of Oriskany Ss.
See Note
?
Former Postulated Limit of Oriskany Ss.
40°45'
INDIANA
ARMSTRONG
0
5
10 MILES
▨ Additional areas now considered prospective for Oriskany Sandstone gas accumulation

Note: PNG 1-4634
N. Martin
Map No. 37 (Fig 16)

Figure 3. Oriskany Sandstone Distribution, Armstrong and Indiana Co's., Pa.

Burley Pool for an initial potential of 9.2 MMCFGPD after frac with 3,925 psi/74 hrs. shut-in pressure, from the Oriskany Sandstone. In Indiana County, Felmont Oil completed their #1 Clearfield Bituminous Coal well in the Pineton pool for an initial potential of 9.95 MMCFGPD after frac with 4,250 psi/17 hrs. shut-in pressure from the Onondaga Chert and Oriskany Sandstone.

FORMER HIGHLIGHT WELLS

The Survey first classified certain oil and gas wells as Highlight wells in 1968. Figures 4, 5, 6, and 7 show the production history of four 1968 highlight wells. Figure 8 shows the production history of an average Red Valley sand well whose initial production is 50 barrels of oil per day. Meaningful oil production histories of highlight wells are hard to obtain since most wells are produced into a common tank battery soon after completion and individual well production records are seldom available. The same is true with gas wells for the transportation line pressure varies, the wells are not produced continuously, and in some cases are shut-in for a day or sometimes months.

The production curves shown are not of typical highlight wells. The curves shown are for those highlight wells for which production data was available.

PART II. OIL AND GAS INDUSTRY ACTIVITY FOR 1970

BASIS FOR STATISTICS

Local industry statistics herein reported are consistent with figures submitted to national industry organizations. Consequently, drilling and completion data are entirely based on drillers' records and location plats forwarded to the Pennsylvania Geological Survey by the Office of the Deputy Secretary—Oil and Gas, of the Department of Environmental Resources, the administrative and regulatory agency for the Oil and Gas Laws. Only those wells for which records and plats have been received

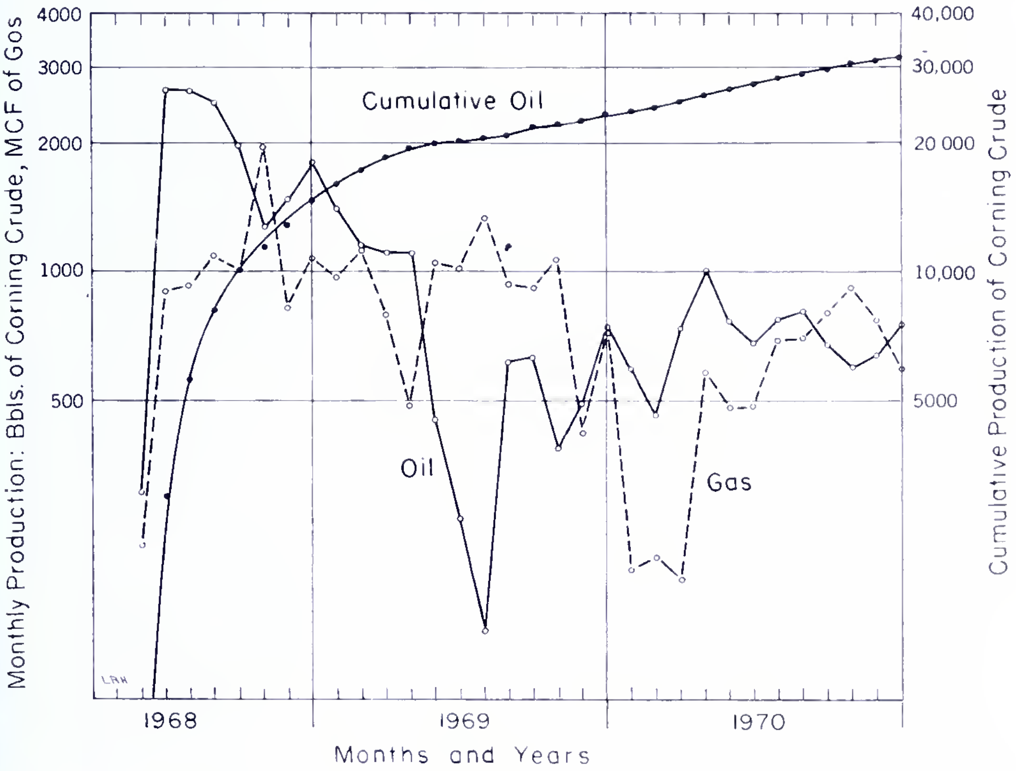


Figure 4. Highlight Well, Comp. 1/25/68, Medina Production, No. 1 Cooper by James V. Shearer, Spring Twp., Crawford Co., Pa. Indian Springs Pool, Ave. I. P. during first month 88BOPD

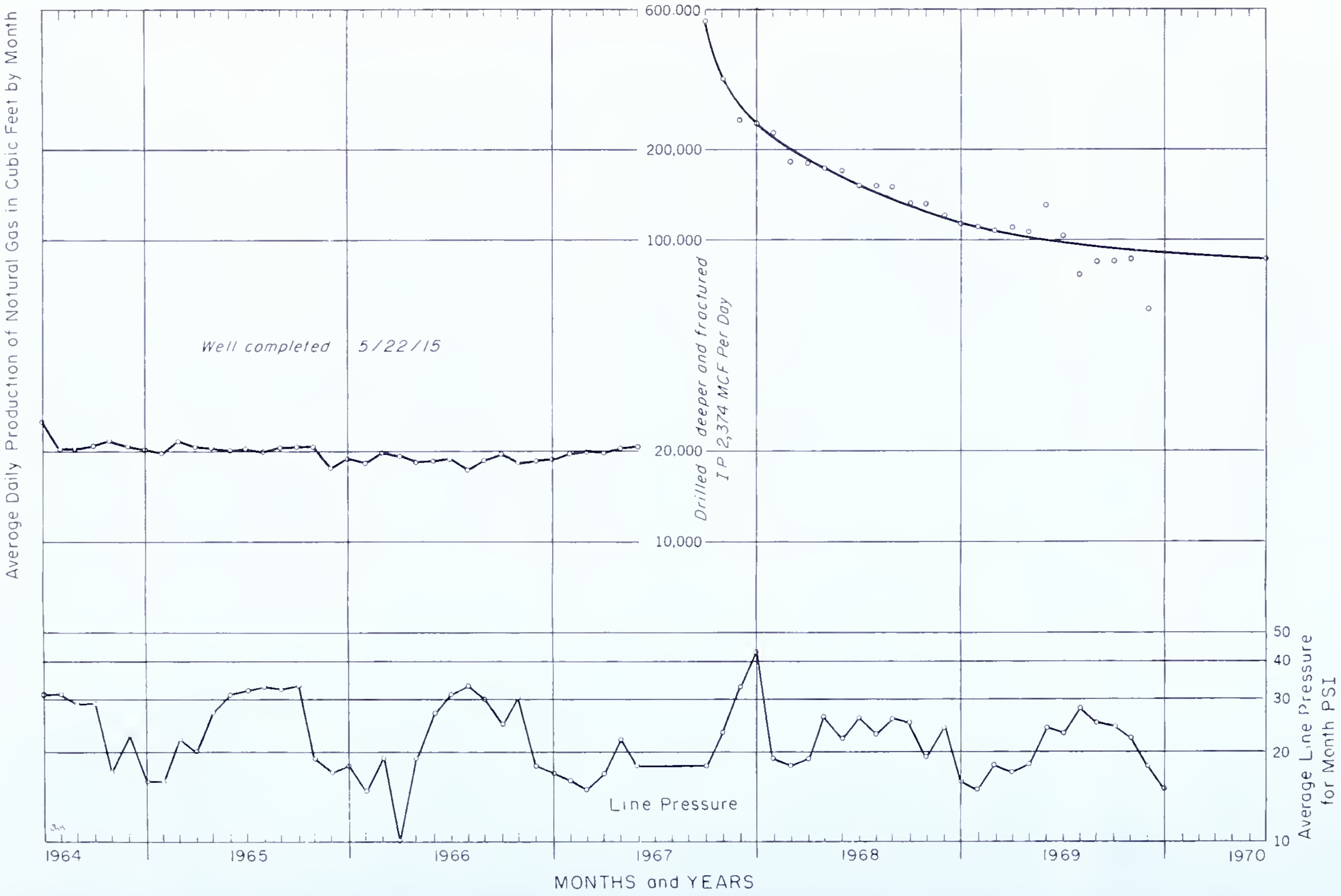


Figure 5. Highlight Well, Reported 1968, Bradford Sand Gas Well, Vandergrift Field, Armstrong Co., Pa.

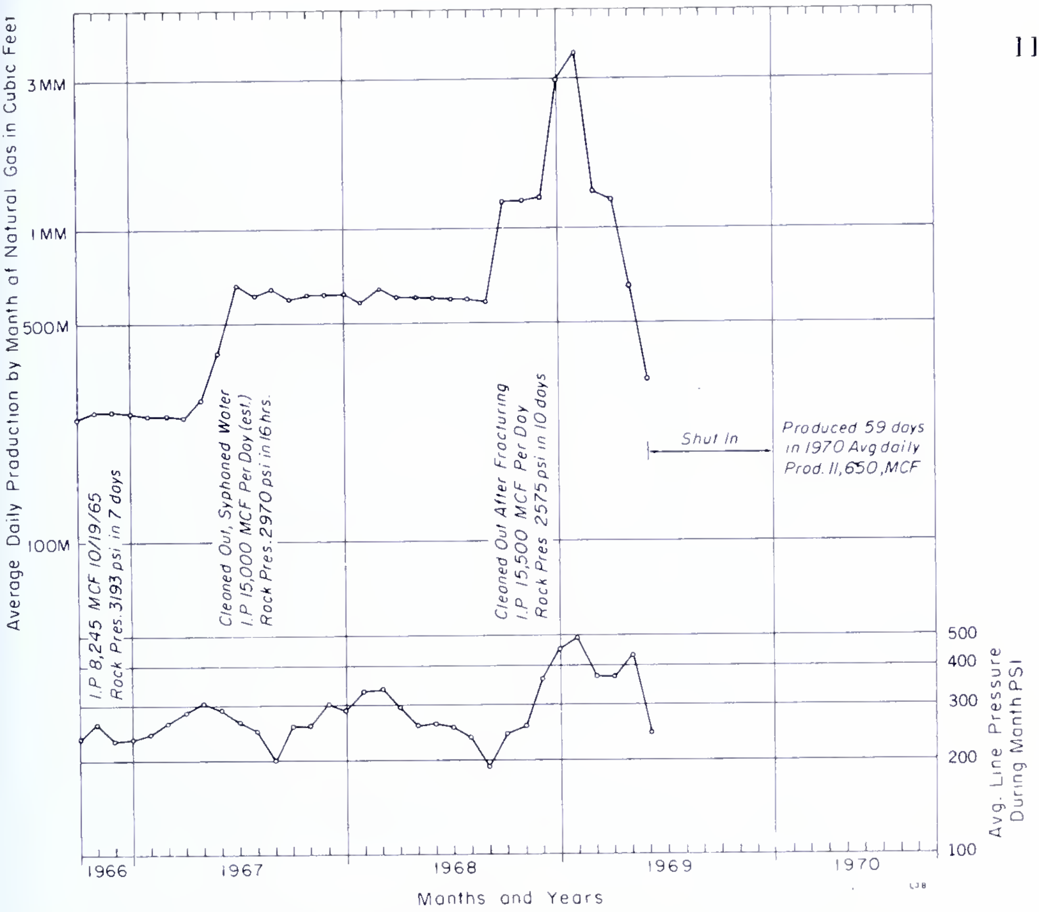


Figure 6. Highlight Well, Reported 1968, Onondaga Chert-Oriskany Gas Well, Rager Mt. Field, Cambria Co., Pa.

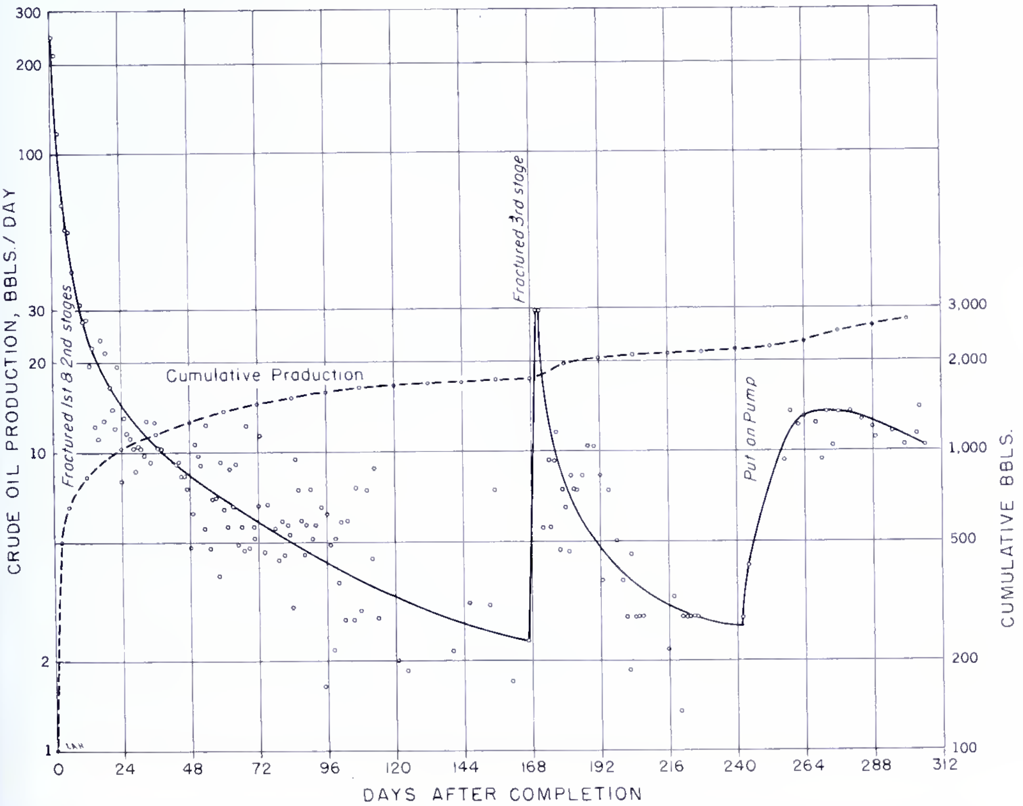


Figure 7. Highlight Well, 1966, Venango Second Sand Oil Well, Foster Reno Field, Venango Co., Pa.

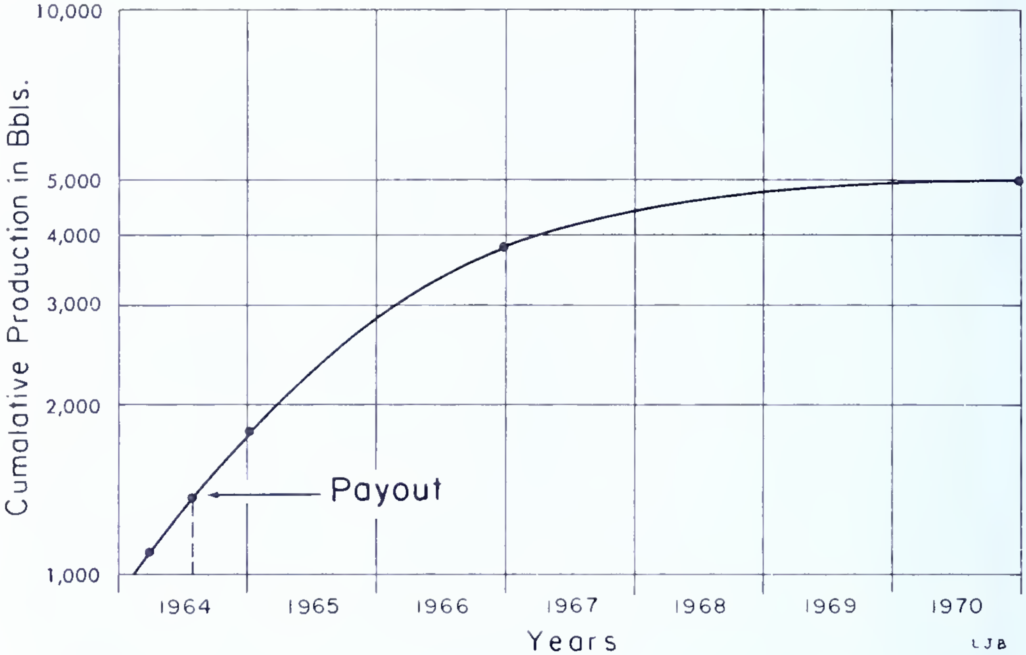


Figure 8. Cumulative production curve of a typical Red Valley sand oil well whose I. P. of 50 BOPD was realized after fracturing. Pleasantville Field, Venango Co., Pa.

within the year are reported. This includes wells drilled in prior years for which records were submitted and received in 1970. It does not include 1970 wells completed for which records had not been submitted within the year.

Oil production and reserves data were obtained from the American Petroleum Institute, gas production and reserves data were obtained from the American Gas Institute and data on county production and producing wells (Table 2) were obtained from the Pennsylvania Department of Commerce, Bureau of Statistics.

PREVIOUS COMPILATIONS

The deep well summarized records (those which reach rocks of Middle Devonian age or older) are shown in Table 16 and the location of the deep exploratory wells are on Figure 9. For those deep wells drilled prior to 1950, the summarized records and other information on the Commonwealth's oil and gas activities are to be found in Bulletin M31. Similar information for the 1950 to 1954 period was published in Bulletin M39 and for the 1955 to 1959 period in Bulletin M45. For the years 1960 through 1969 this information was published annually in Progress Reports 158, 160, 165, 166, 172, 173, 175, 177, and 181 of the Pennsylvania Bureau of Topographic and Geologic Survey. Oil and gas developments in the shallow sands (Upper Devonian or younger) are described in Bulletin M45 and Progress Reports 135, 139, 143, 144, 147, 150, 151, 154, 155, 157, 158, 160, 166, 168, 172, 173, 175, 177, and 181.

A list of deep-well samples on file with the Survey was published in the Survey's Catalogue of Deep Well Samples (W. R. Wagner, IC16). Supplemental lists were published in Progress Reports 157, 158, 160, 165, 166, 168, and 173. These and other deep and shallow well samples, geophysical logs, and other well data are also on file with the Survey.

INDICATED STATUS OF LOCAL INDUSTRY

Oil wells completed in 1970 decreased 20 percent, Pennsylvania grade oil production 10 percent, and oil reserves 7 percent to 50,790,000 barrels. Corning grade crude oil production increased 44 percent but reserves declined 12 percent to 493,000 barrels. The local industry is not

Table 2. Oil wells and crude oil in Pennsylvania by counties, 1969, 1970**

County	*1969 Crude oil production (bbls)*	*Number of producing oil wells as of 12/31/69*	*1970 Crude oil production (bbls)*	*Number of producing oil wells as of 12/31/70*
Allegheny	85,750	236	70,113	221
Armstrong	8,311	84	8,696	81
Beaver	5,904	69	7,202	65
Butler	117,019	1,750	105,600	1,634
Clarion	24,769	413	18,980	390
Crawford	69,285	657	72,235	656
Elk	37,638	68*	31,791	66
Erie	601	29	138	29
Fayette	271	4	227	4
Forest	65,815	641	39,905	614
Greene	43,846	280	36,524	218
Jefferson	2,373	54	1,486	52
McKean	2,421,345	15,207	2,229,658	15,349
Mercer	775	89	886	85
Potter	18,005	181	16,335	185
Venango	370,726	12,132	311,121	11,656
Warren	649,977	5,009	629,117	4,821
Washington	126,839	725	110,421	675
Total	4,049,249	37,628*	3,690,435	36,801

* Revised figure

** Data from the Department of Commerce, Bureau of Industrial Development, Division of Statistics, Harrisburg, Pennsylvania.

developing enough oil to supplement or hold reserves steady. Production of oil continues to utilize reserves at a relatively rapid rate.

Reserves of gas increased 6 percent while production declined 2 percent and completed gas wells 6 percent. The amount of gas in storage increased 17 percent over that of 1969.

Table 3. Drilling and completions reported 1970

Classification			*1970*			*1969*		*% Change*
SHALLOW WELLS	New Wells		649			823		- 21
	Gas	200			232			- 14
	Oil		430			539		- 20
	Dry			19			52	- 63
	Deepened		43			47		- 9
	Gas	30			26			+ 15
	Oil		12			9		+ 33
	Dry			1			12	- 92
	Sub Total		692			870		- 20
	Gas	230			258			- 11
	Oil		442			548		- 24
	Dry			20			64	- 69
DEEP WELLS (NEW)	Gas	28			17			+ 65
	Dry			5*			8+	- 38
	Sub Total		33			25		- 32
PRIMARY SUBTOTAL			725			895		- 19
	Gas	258			275			- 6
	Oil		442			548		- 19
	Dry			25			72	- 65
Service (Gas & Water Injection)			48			122		- 61
Miscellaneous (Mostly Gas Storage)			57**			15*		+280
Stratigraphic			3			1		+200
Old Well Workovers			182***			143		+ 27
OTHER SUBTOTAL			290			281		+ 3
TOTAL ALL WELLS			1015			1176		- 14

* Includes one deep well drilled deeper.

*** Includes one deep well which resulted in a deeper pool discovery.

** Includes 18 deep storage wells drilled deeper.

+ Includes one deep well which resulted in a shallow discovery.

Drilling and Completions

Table 3 shows drilling and completions decreased during 1970 for shallow oil and gas while it increased for deep gas.

During 1970 exploratory well drilling remained the same while development drilling decreased 20 percent as shown in Table 4.

Table 4. Exploratory and primary development reported 1970

Type Well	*1970*	*1969*	*% Change*
Exploratory	41	42	– 2
Gas	22[a]	10	+120
Oil	2	3	– 33
Dry	17[b]	29	– 41
% Successful	58	31	+ 87
Development	684	853	– 20
Gas	236[c]	265	–11
Oil	440	545	– 19
Dry	8[d]	43	– 81
% Successful	99	95	+ 4
TOTAL	725	895	– 19
Gas	258	275	– 6
Oil	442	548	– 19
Dry	25	72	– 65
% Successful	96	92	+ 4

[a] Includes 4 deep wildcat discoveries, 1 of which is an old well workover.
[b] Includes 4 deep wildcat failures.
[c] Includes 25 deep wells.
[d] Includes 1 deep well.

The depth of an average exploratory well decreased while most footage was drilled for shallow objectives at greater average depth than in 1969 (Table 5).

Table 5. Footage Reported, 1970 and 1969

	Footage			*Average Per Well*	
Class	*1970*	*1969*	*% Change*	*1970*	*1969*
Exploratory	124,313	153,565	–19	3,032	3,656
Development	1,232,506	1,486,239	–17	1,802	1,742
Other	301,940	291,140	+ 4	2,796	2,110
Total	1,658,759	1,930,944	–14	1,991	1,869

The 1970 reported discoveries are listed in Table 6 and more important dry exploratory tests reported are shown in Table 7. The locations of all the exploratory tests are shown in Figure 9. The breakdown of completions by county is shown in Table 8, and the old wells drilled

Table 6. Reported Discoveries in Pennsylvania, 1970

Map No.	County	Operator Well No. & Lease	Compl. Date M-D-Y	Total Depth (Ft.)	Name of Formation at T.D.	Prod. Depth (Ft.)	Prod. Form. or Zone	Initial Daily Prod.	Field or Pool Name	Explor. Class	Remarks
41	Armstrong	Pennzoil United, Inc. RR-1 Canterbury Coal Co.	12/14/70	7,235	Helderberg	7,042	Onondaga Chert Oriskany	2,170 MCF	Roaring Run Oriskany Pool	DPD	Roaring Run Anticline in Roaring Run Field
37		Peoples Nat. Gas Co. 1 Nellie C. Martin	10/23/70	15,574	Elbrook	6,420	Onondaga Chert Oriskany	1,100 MCF	Snydersville Pool	DPD	Greendale Anticline in Goheenville Field
19	Clearfield	Cons. Gas Supply Corp. 1 Helen T. McGee	6/11/70	3,770	Canadaway Group	2,410	Canadaway Group	375 MCF	New Washington Pool	NPD	NW flank of Nolo Anticline in Burnside Field
32	Greene	Keystone Gas Co. 3 West Penn Power Co.	9/ 8/70	2,042	Conewango Group	1,998	Fifth Sand	294 MCF	Rosedale Pool	NPD	Stratigraphic trap Indiana Anticline Point Marion Field
40	Indiana	Felmont Oil Corp. 1 Richard G. Hanwell, Jr.	12/20/69	8,199	Helderberg	8,139	Oriskany	6,150 MCF	Pineton Pool	NPD	Nolo Anticline in Strongstown Field
27		T. W. Phillips G. & O. Co. 1 William C. Leasure	11/ 9/70	3,792	Canadaway Group	2,859	Canadaway Group	87 MCF	Brush Valley Pool	SPD	SE flank of Chestnut Ridge Anticline in Cherry Hill Field

6	Lycoming	Harold L. Fox 1 Arnold M. Fox & Sons	10/29/69	3,990	Canadaway Group	2,050	Upper Devonian	30 MCF	Shrewsbury Field	NFD	Stratigraphic trap in northeastern Pennsylvania
34	Warren	Myrle L. Cady 1 Pettigrew	5/29/70	4,430	Queenston	4,430	Medina	250 MCF	Pettigrew Pool	DPD	Old well cleaned out and fractured in Sugar Grove Field

Table 7. Selected Exploratory Failures Reported in Pennsylvania, 1970

Map No.	*County*	*Operator Well No. & Lease*	*Compl. Date M-D-Y*	*Total Depth (Ft.)*	*Name of Formation at T. D.*	*Explor. Class or Field*	*Remarks*
38	Blair	Peoples Natural Gas Co. 1 Fred E. Conrad	9/17/70	3,350	Helderberg	NFW	Oriskany test east of Allegheny Topographic Front, 1 mile NW of Oriskany outcrop.
39		Peoples Natural Gas Co. 1 Ivory Weldon	8/12/70	5,823	Helderberg	NFW	Oriskany test east of Allegheny Topographic Front, 2 miles NW of Oriskany outcrop.
36	Butler	August M. Rozic 2 August M. Rozic	10/31/69	5,636	Oriskany	DPW	Test of gentle SE dipping Oriskany.
9	Clearfield	Consolidated Gas Supply Corp. 1 Helen D. S. Gordon	9/ 2/70	3,287	Kane	SPW	NW flank of Chestnut Ridge anticline, tested Canadaway section.
10		Consolidated Gas Supply Corp. 6 Pa. Dept of F. & W. Tr. No. 63	11/ 6/70	2,930	Haskill	SPW	NW flank of Chestnut Ridge anticline, tested Canadaway section.
8		Consolidated Gas Supply Corp. 12 Antonio J. Palumbo	11/18/70	3,018	Kane	SPW	NW flank of Chestnut Ridge anticline, tested Canadaway section.
31	Fayette	M. C. Brumage and Sons 3611 Pietro DeCarlo	12/29/67	3,093	Elizabeth	DPW	OWDD on SE flank of Brownsville anticline, testing Big Injun to Elizabeth section.
21	Indiana	Peoples Natural Gas Co. 1 Richard Kinter	4/24/70	3,600	Haskill	NFW	Test of Canadaway section on Richmond anticline.

12	Jefferson	Consolidated Gas Supply Corp. 1 R. & P. Coal Co.	6/15/70	3,559	Haskill	NFW	Canadaway pay zone test.
33	Somerset	Consolidated Gas Supply 1 Walter W. Foy	9/21/70	4,498	Benson	NFW	Benson test on Negro Mountain anticline.
2	Warren	Paul Waugaman 3 Kowalski	9/24/69	603	Venango Second	NFW	Test of Red Valley and Venango Second, Upper Devonian.
35		Pennzoil United, Inc. TT-1 Lot 74	11/17/70	5,683	Lockport	DPW	Oriskany test on small anticline in Clarendon Field.
29	Washington	Union Drilling, Inc. 1 Harry E. Killen, Jr.	5/21/70	2,898	Fifth	NPW	Venango Group test on SE flank of Claysville anticline.
28	Westmoreland	William E. Snee, et. al. 1 Louise M. Charlton	2/13/70	3,800	Bradford Second	DPW	Failed to confirm Sherrick Run discovery, dry through Bradford Second.

*Table 8. Well completions in Pennsylvania, 1970**

	TOTAL		GAS			OIL			DRY	
County	*No. of Wells*	*Aver. Total Depth (feet)*	*No. of Wells*	*Aver. Init. Open-flow (MCFGPD)*	*Aver. Total Depth (feet)*	*No. of Wells*	*Aver. Init. Production (BOPD)*	*Aver. Total Depth (feet)*	*No. of Wells*	*Aver. Total Depth (feet)*
Armstrong	22	3,750	22	390	3,750	0	0	0	0	0
Beaver	1	1,732	0	0	0	1	3	1,732	0	0
Blair	2	4,587	0	0	0	0	0	0	2	4,587
Butler	6	1,485	2	21	1,810	3	1	1,395	1	1,108
Cambria	4	8,426	3	3,940	8,335	0	0	0	1	8,697
Clarion	12	1,580	10	76	1,654	2	5	1,207	0	0
Clearfield	17	3,350	17	867	3,350	0	0	0	0	0
Crawford	16	3,619	14	1,304	4,033	2	7	718	0	0
Elk	6	2,048	3	133	2,204	3	20	1,892	0	0
Erie	3	3,233	3	3,808	3,233	0	0	0	0	0
Fayette	1	3,003	1	56	3,003	0	0	0	0	0
Forest	26	975	4	253	1,678	20	24	818	2	1,134
Indiana	121	3,714	119	1,126	3,715	0	0	0	2	3,675
Jefferson	24	3,327	21	85	3,364	0	0	0	3	3,066
Lycoming	1	3,990	1	30	3,990	0	0	0	0	0
McKean	86	1,837	1	202	4,472	84	3	1,803	1	2,064
Potter	3	1,322	0	0	0	3	14	1,322	0	0
Somerset	1	4,498	0	0	0	0	0	0	1	4,498
Venango	142	710	0	0	0	141	5	706	1	1,224
Warren	174	903	1	2	4,430	169	44	859	4	1,854
Washington	4	2,766	0	0	0	2	36	2,862	2	2,669
Westmoreland	8	3,322	5	751	3,487	0	0	0	3	3,046
Wyoming	1	1,399	1	45	1,399	0	0	0	0	0
TOTAL	681	1,933	228	908	3,559	430	21	1,018	23	2,933

* Does not include service wells, miscellaneous wells, stratigraphic/core tests or old wells drilled deeper.

Table 9. Old wells drilled deeper in Pennsylvania, 1970

	TOTAL		GAS			OIL			DRY	
County	*No. of Wells*	*Aver. Amt. Deepened (feet)*	*No. of Wells*	*Aver. Init. Open-Flow (MCFGPD)*	*Aver. Amt. Deepened (feet)*	*No. of Wells*	*Aver. Init. Production (BOPD)*	*Aver. Amt. Deepened (feet)*	*No. of Wells*	*Aver. Amt. Deepened (feet)*
Armstrong	12	1,234	11	152	1,345	0	0	0	1	13
Butler	1	3,022	0	0	0	0	0	0	1	3,022
Cambria	1	8,379	1	2	8,379	0	0	0	0	0
Clarion	1	1,281	1	135	1,281	0	0	0	0	0
Elk	1	365	1	83	365	0	0	0	0	0
Fayette	1	1,129	1	1,338	1,129	0	0	0	0	0
Forest	11	100	0	0	0	11	19	100	0	0
Greene	1	845	1	294	845	0	0	0	0	0
Indiana	9	775	9	1,049	775	0	0	0	0	0
Jefferson	5	331	5	1,251	331	0	0	0	0	0
McKean	1	571	0	0	0	1	0	571	0	0
TOTAL	44	912	30	640	1,181	12	18	139	2	1,518

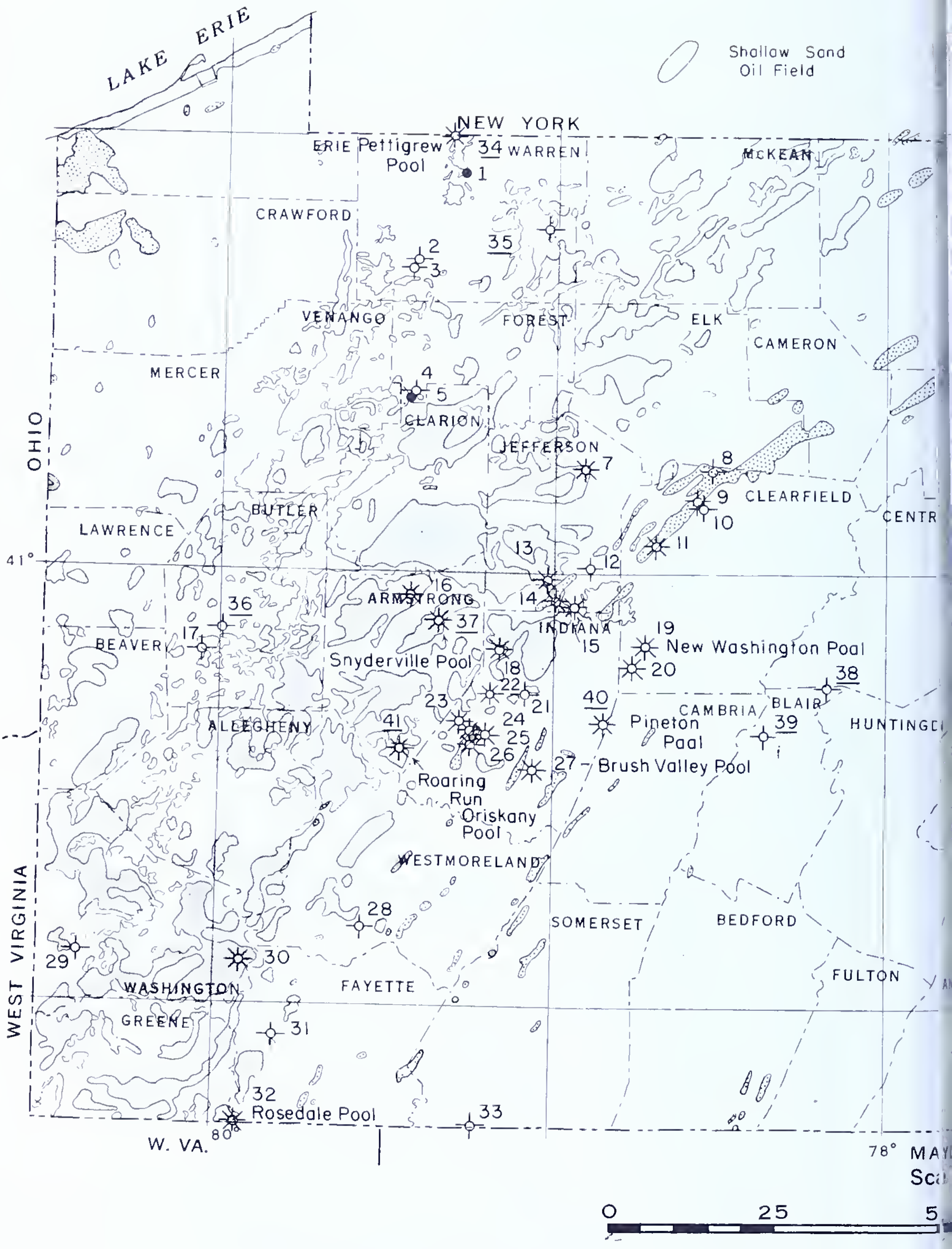
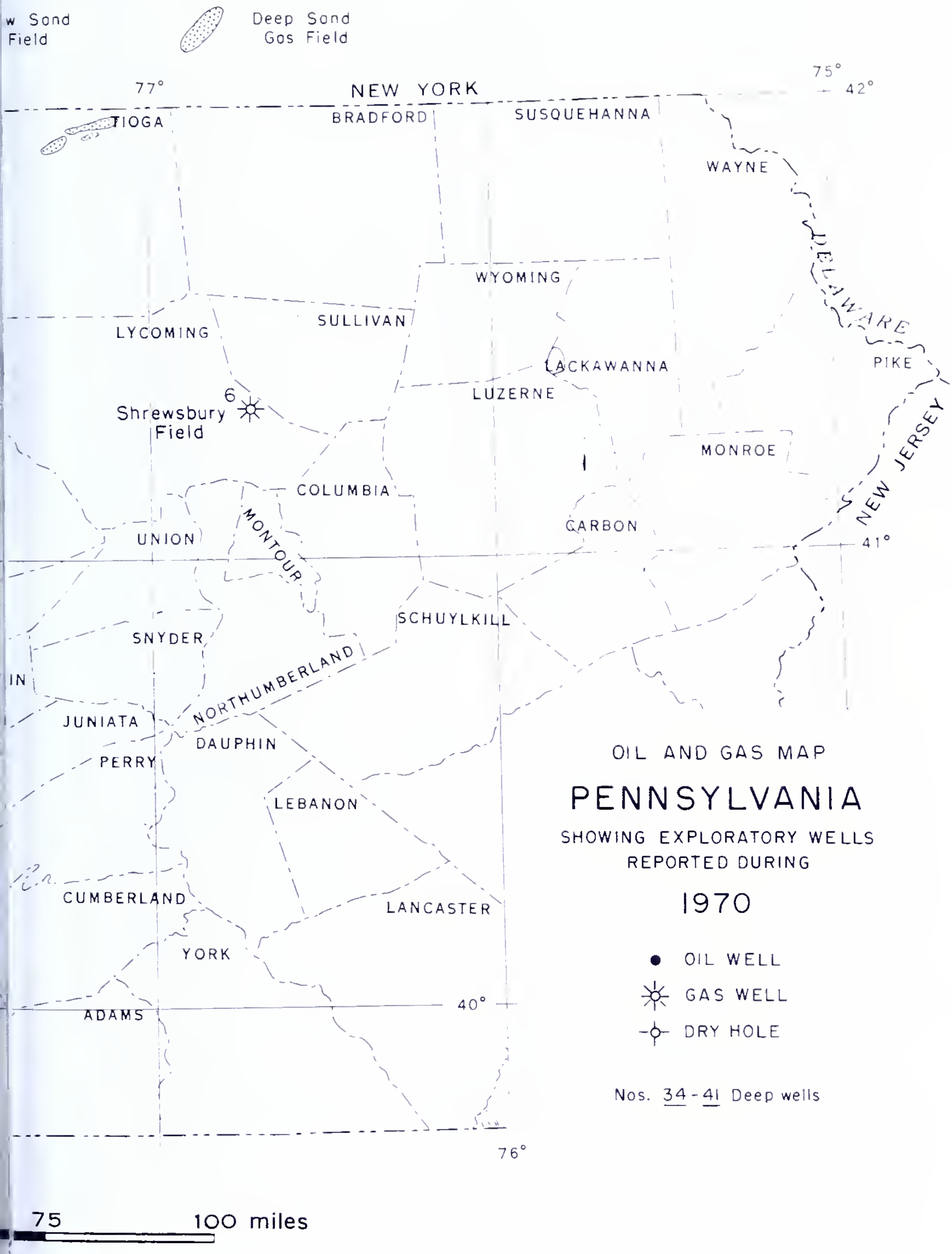


Figure 9. Oil and gas map of Pennsyl



ng exploratory wells reported in 1970.

deeper in Table 9. Figure 10 is a graph of the annual rate of shallow well activity in the Commonwealth from 1950 to 1970 while Figure 11 shows the annual rate of deep exploration and development from 1930 to 1970.

At the end of 1970, a total of 3,052 deep wells had been drilled during the year in the Commonwealth. Of the 3,052 deep wells, 1,671 (revised) were gas wells, 127 (revised) were oil and gas wells, 1,076 were dry holes, 174 were drilled for gas storage, and 4 are being used for waste disposal.

Production and Reserves

As shown by Table 2 and Table 10 oil and gas production decreased during the year. Reserves of oil declined while gas reserves increased. The portion of gas reserves stored increased 17 percent.

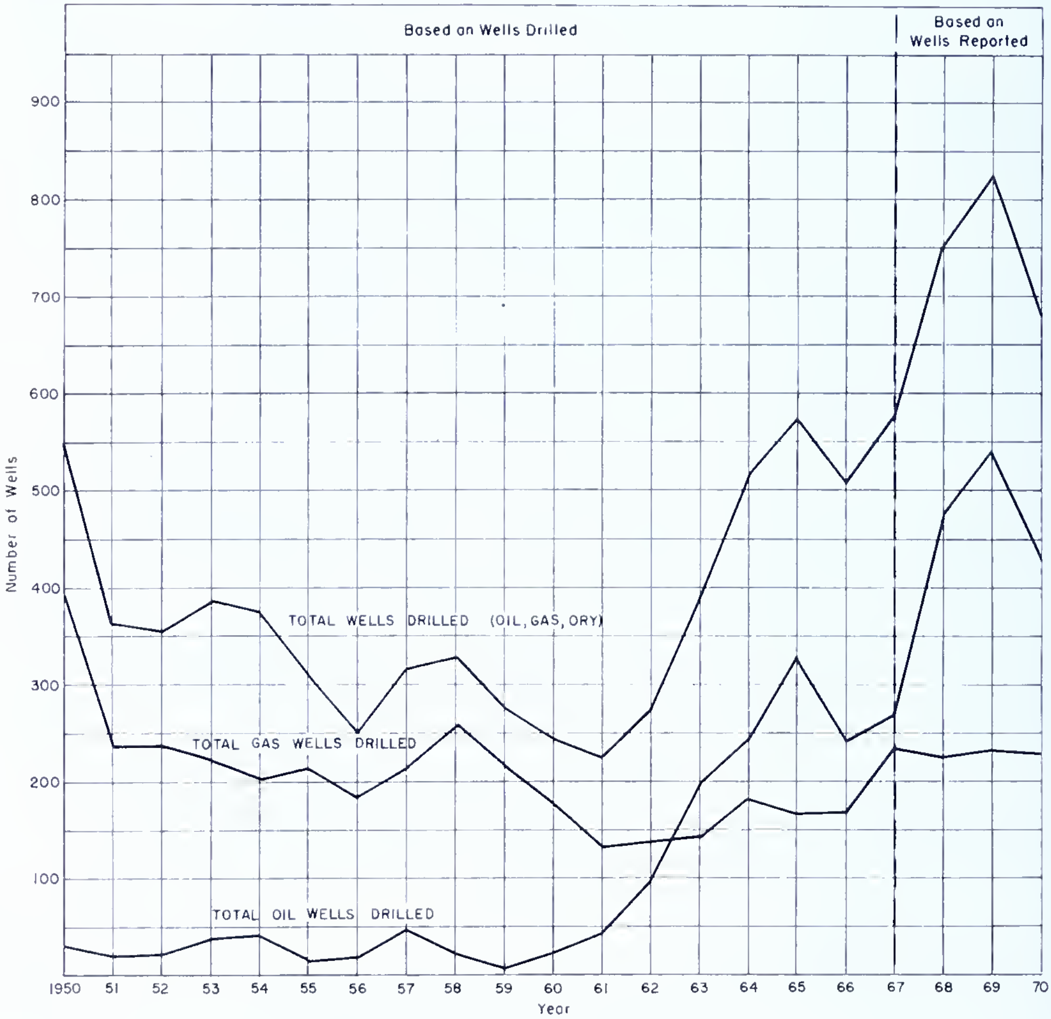


Figure 10. Shallow well activity 1950-1970.

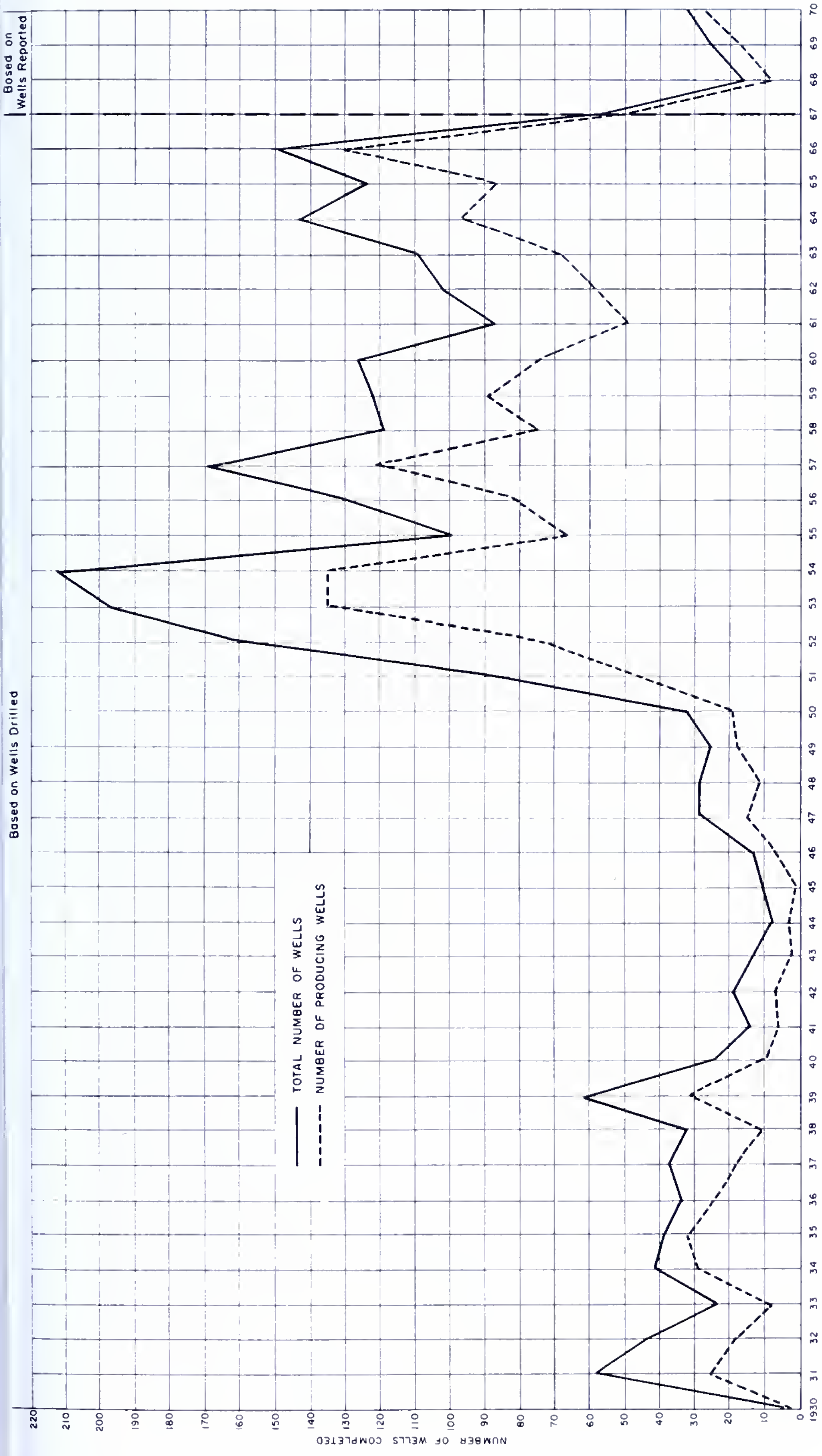


Figure 11. Annual rate of deep sand exploration and development in Pennsylvania.

Table 10. Production and reserves in Pennsylvania, 1970

		Production				*Reserves*		
		1970	*1969*	*% Change*	*Cumulative to 12/31/70*	*1970*	*1969*	*% Change*
Oil (1,000 Bbls.)	Pa. Grade	3,950	4,403	– 10	1,269,282	50,790	54,740	– 7
	Corn. Grade	65	45	+44	207	493	558	– 12
	TOTAL OIL	4,015	4,448	– 10	1,269,489	51,283	55,298	– 7
	Natural Gas Liquids (1,000 Bbls.)	78	90	– 13	—	896	974	– 8
Gas (MMCF)	Shallow	62,321	61,292	+ 2	—	—	—	—
	Deep	15,214	17,842	– 15	—	—	—	—
	TOTAL GAS	77,535	79,134	– 2	8,527,156	1,377,502*	1,303,907*	+ 6
	* Portion Stored Gas					584,959	498,569	+17

The 65,000 barrels of Corning grade crude oil were produced from the Medina Sandstone (Lower Silurian) in Crawford and Erie counties. The Bradford District continued to produce the most oil (Table 11).

Table 11. Average Daily Oil Production

District	*1970*	*1969*	*% Change*
Bradford Field (Penna. portion only)	6,214	7,391	– 16
Middle and Southwestern	4,605	4,671	– 1
Medina Corning	178	123	+45
TOTAL	10,997	12,185	– 10

Figure 12 shows the annual production of crude oil in Pennsylvania from 1859 to 1970 and for the Bradford District from 1871 to 1970. The monthly variation in crude oil price, production and well completions

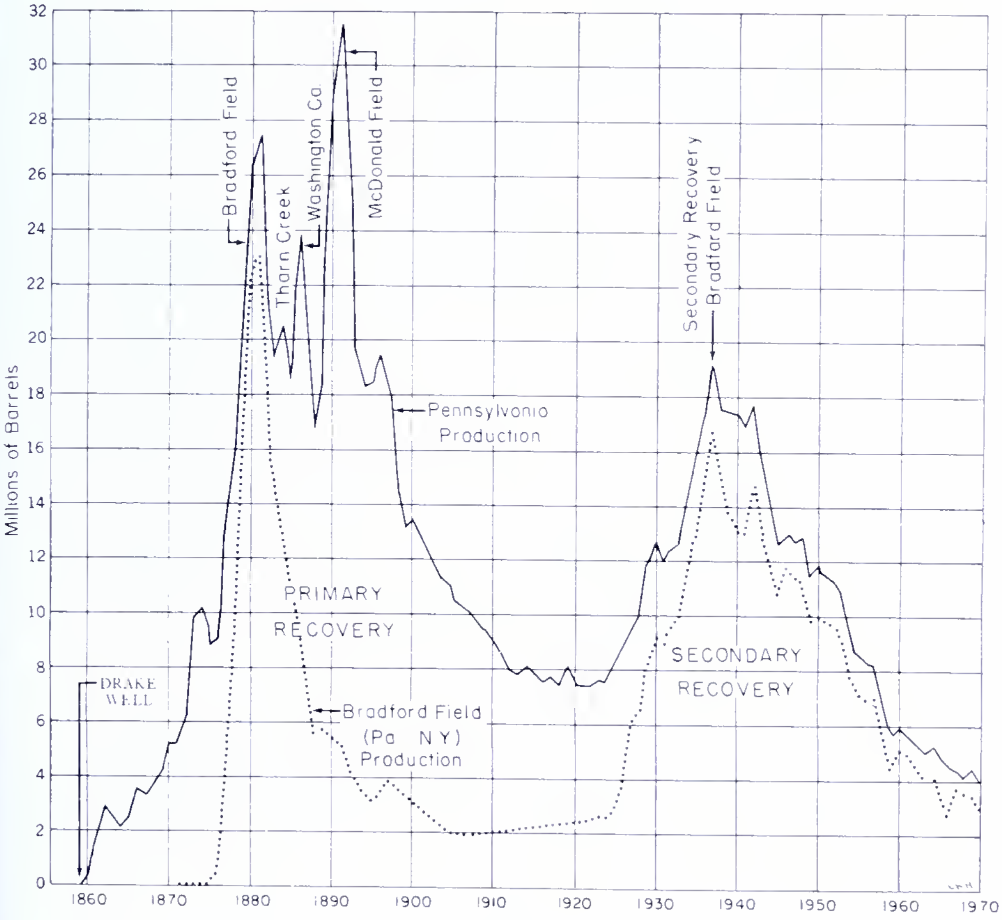


Figure 12. Annual production of crude in Pennsylvania.

are plotted in Figure 13 for the years 1930 to 1970 for the Bradford District.

As of June 1, 1970 there were 16,239 producing gas wells in the Commonwealth. In addition there were 1755 gas storage wells operating in Pennsylvania's 65 gas storage fields.

The 62,321,000 Mcf of shallow gas had a value of $16,521,297 while 15,214,000 Mcf of deep gas had a value of $4,033,231. Figure 14 shows the following for the years 1946 to the present: (1) the yearly production of natural gas, (2) the yearly consumption of natural gas, (3) the natural gas reserves and, (4) the amount of natural gas in storage. The deep gas production by field and pool is shown in Table 12.

Gas Storage Fields

There were 39 new deep gas storage wells drilled during the year plus 18 drilled deeper and several storage wells were worked over (Table 3). Storage well drilling activity was up 280 percent over that of 1969. Figure 9 in Progress Report 181, shows the distribution and lists the names of known gas storage fields in Pennsylvania. Since the publication of the above list Table 13 shows the changes that have taken place with respect to storage fields.

Table 13. Changes in Gas Storage Fields

County	*Name of Storage Field*	*Disposition*
Allegheny	Sligo	Abandoned
Allegheny	Tarentum Stone & Coal	Abandoned
Cambria	Rager Mt.	Being converted to storage
Elk	Mohan Run	Abandoned
Greene	Kerby	Being depleted for abandonment
Indiana	Clark	New storage field
Jefferson	Bullers	Abandoned

Storage capacity increased during the year to 710,038,000 Mcf. Stored gas increased 17 percent to 584,959,000 Mcf.

Subsurface Disposal for Other Industry

The Pennsylvania Geological Survey has sponsored a study on "Subsurface Liquid Waste Disposal and Its Feasibility in Pennsylvania". [The study, which has been completed, was made by Neilson Rudd of Geo-Engineering Laboratories, Inc.] The project consists of three phases: (1) a comprehensive review of the principles of deep well disposal, (2) a discussion of techniques and guidelines for site selection, evaluation,

Table 12. Deep-gas production in Pennsylvania, 1970 (in Mcf)

County	*Field*	*Pool*	*Discovery Date*	*Cumulative Production at End of 1969*	*Production 1970*	*Cumulative Production at End of 1970*	*Status of Field or Pool at End of 1970*
Bedford	Artemus	*TOTAL*	7/30/63	2,413,000	9,000	2,422,000	Producing
		Artemus	7/30/63	1,587,000	9,000	1,596,000	Producing
		Pennland	8/28/64	826,000		826,000	Producing
	Five Forks		6/21/62	14,723,000	166,000	14,889,000	Producing
	Purcell		12/14/57	3,073,000	25,000	3,098,000	Producing
Cambria	Patton	Burley	1/15/69				Shut-in
		Pindleton	6/30/69				Shut-in
	Rager Mt.		10/16/65	8,213,426	1,211,094	9,424,520	Producing
Cameron & Elk	Whippoorwill		7/10/61	13,862,000	350,000	14,212,000	Producing
Cameron, Elk, Jefferson, Clearfield and Indiana	Punxsutawney-* Driftwood	*TOTAL*	9/15/51	465,983,000	3,699,000	469,682,000	Producing
		Benezette	1/ 5/53	241,131,000	1,200,000	242,331,000	Producing
		Driftwood	9/15/51				
		Boone Mt.	9/18/58	98,567,000	1,193,000	99,760,000	Producing
		DuBois	1/ 6/60				
		Sabula	8/26/63	770,000	32,000	802,000	Producing
		Helvetia	5/11/60	121,639,000	1,195,000	122,834,000	Producing
		Reed-Deemer	5/ 9/55 12/ 1/53				
		Rockton	2/25/55				
		Sykesville	11/10/60				
		Hicks Run	6/ 7/56	3,876,000	79,000	3,955,000	Producing
Clinton & Potter	Leidy	*TOTAL*	1/ 9/50	159,886,675	87,206	159,973,881	Gas Storage & Prod.
		Ole Bull	1/ 9/59	5,086,643	87,206	5,173,849	Producing
Crawford & Erie	Conneaut	*TOTAL*	2/11/57	24,017,030	2,372,700	26,389,730	Producing & Aban.
		Bushnell-Lexington	12/31/58	11,588,416	867,606	12,456,022	Producing
		Indian Springs	9/11/57	8,154,770	1,164,582	9,319,352	Producing
		Kastle	7/14/62	2,025,575	237,193	2,262,768	Producing
		Lundys Lane	11/ 9/61	1,229,215	101,991	1,331,206	Producing

Table 12. Continued.

County	Field	Pool	Discovery Date	Cumulative Production at End of 1969	Production 1970	Cumulative Production at End of 1970	Status of Field or Pool at End of 1970
		Pierce	12/31/58	643,323	1,328	644,651	Producing
Erie	Burgess		10/17/60	132,603	4,879	137,482	Producing
	Corry	*TOTAL*	4/29/47	1,029,830	6,117	1,035,947	Gas Storage & Prod.
		Beaver Dam	5/20/53	176,130	6,117	182,247	Producing
	Meade		8/23/46	4,914,194	3,994	4,918,188	Oriskany Gas Storage (One Producing Medina Well)
Fayette	Ohiopyle		12/28/59	3,596,837**	128,592	3,725,429	Producing
	Sandy Creek*		8/ 8/63	334,456	105,830	440,286	Producing
		Fike	8/ 8/63	314,456	32,830	347,286	Producing
		Quebec Run	6/31/69	20,000	73,000	93,000	Producing
	Spruell		10/31/61	1,152,781	208,086	1,360,867	Producing
	Summit	*TOTAL*	3/24/38	41,993,640**	219,887	42,213,527	Producing & Aban.
		North Summit	3/24/38	20,835,097	74,887	20,909,984	Producing
		South Summit	5/ 9/42	21,131,393	145,000	21,276,393	Producing
Indiana	Cherry Hill*	Crichton	1/ 9/63	2,499,576	112,013	2,611,589	Producing
		Hadden	7/11/63				
	Jacksonville		9/21/56	25,744,420	258,653	26,003,073	Producing
	Nolo		9/30/56	10,322,515	105,064	10,427,579	Producing
	Strongstown	Pineton	12/20/69				Shut-in
Jefferson	Big Run*	Elk Run	6/30/65	36,182,000	3,544,000	39.726,000	Producing
McKean	Mallory		12/ 1/60	134,123		134,123	Abandoned
Mercer	Henderson	Kilgore	10/26/66				Producing
	Wheatland		7/24/63	109,272	9,420	118,692	Producing
Potter	Ulysses		10/ 2/39	3,295,681	136,959	3,432,640	Producing
		New Field	4/ 2/62				
Somerset	Boswell	*TOTAL*	11/11/58	9,964,752	203,868	10,168,620	Producing

		Boswell	11/11/58	9,121,743	185,483	9,307,226	Producing
		Snyder	6/16/60	843,009	18,385	861,394	Producing
Warren	Sugar Grove	Pettigrew	5/29/70				Producing
Washington	Daniels Run*	Glyde	9/ 6/61	74,818	6,477	81,295	Producing
	Belle Vernon	Lover	8/14/68	23,055	10,034	33,089	Producing
Westmoreland	Blairsville*	Kahl	10/23/62	7,728,325	523,113	8,251,438	Producing
	Latrobe*	Dry Ridge	8/25/46	4,634,102	136,587	4,770,689	Producing
	Jacobs Creek*	Bailey	12/26/61	821,019	144,031	965,050	Producing
	Lycippus	*TOTAL*	8/17/49	5,830,751	111,883	5,942,634	Producing & Aban.
		St. Boniface Chapel	9/13/56	5,091,323	111,883	5,203,206	Producing
	Murrysville*	*TOTAL*	11/ 3/1878	384,819	37,035	421,854	Producing
		Sloan	10/22/63	123,511	382	123,893	Abandoned
		Duquesne	8/ 8/65	261,308	36,653	297,961	Producing
Westmoreland & Somerset	Johnstown	*TOTAL*	5/16/57	21,413,090	929,760	22,342,850	Producing & Aban.
		Baldwin	5/22/60	7,367,779	323,920	7,691,699	Producing & Aban.
		Beck	5/16/57				
		Williams	2/14/58	14,045,311	605,840	14,651,151	Producing
	Seven Springs	*TOTAL*	12/15/58	6,757,699	347,244	7,104,943	Producing & Aban.
		Blair	12/ 5/58	5,590,433	307,842	5,898,275	Producing
		Tunnel	3/10/65				
		Seven Springs	8/ 3/66	443,843	39,402	483,245	Producing

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* "Shallow" Gas Production of Field Not Shown

** Corrected Figures

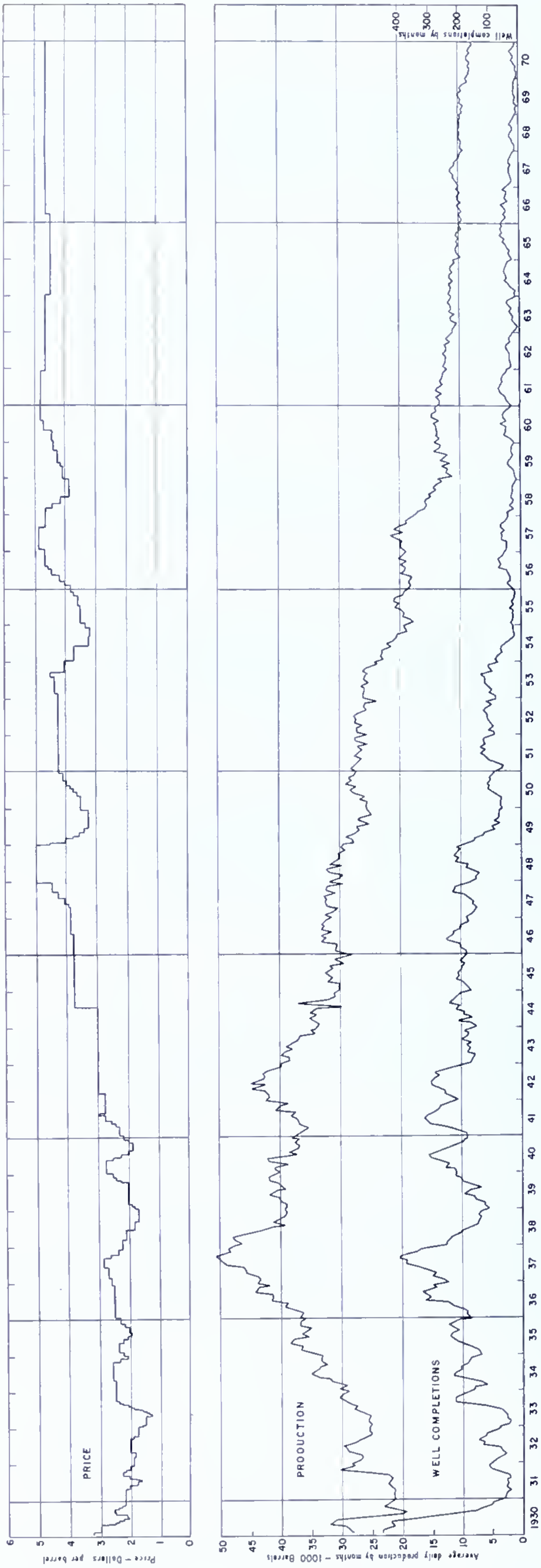


Figure 13. Crude oil prices, production, and completions, Bradford Field.

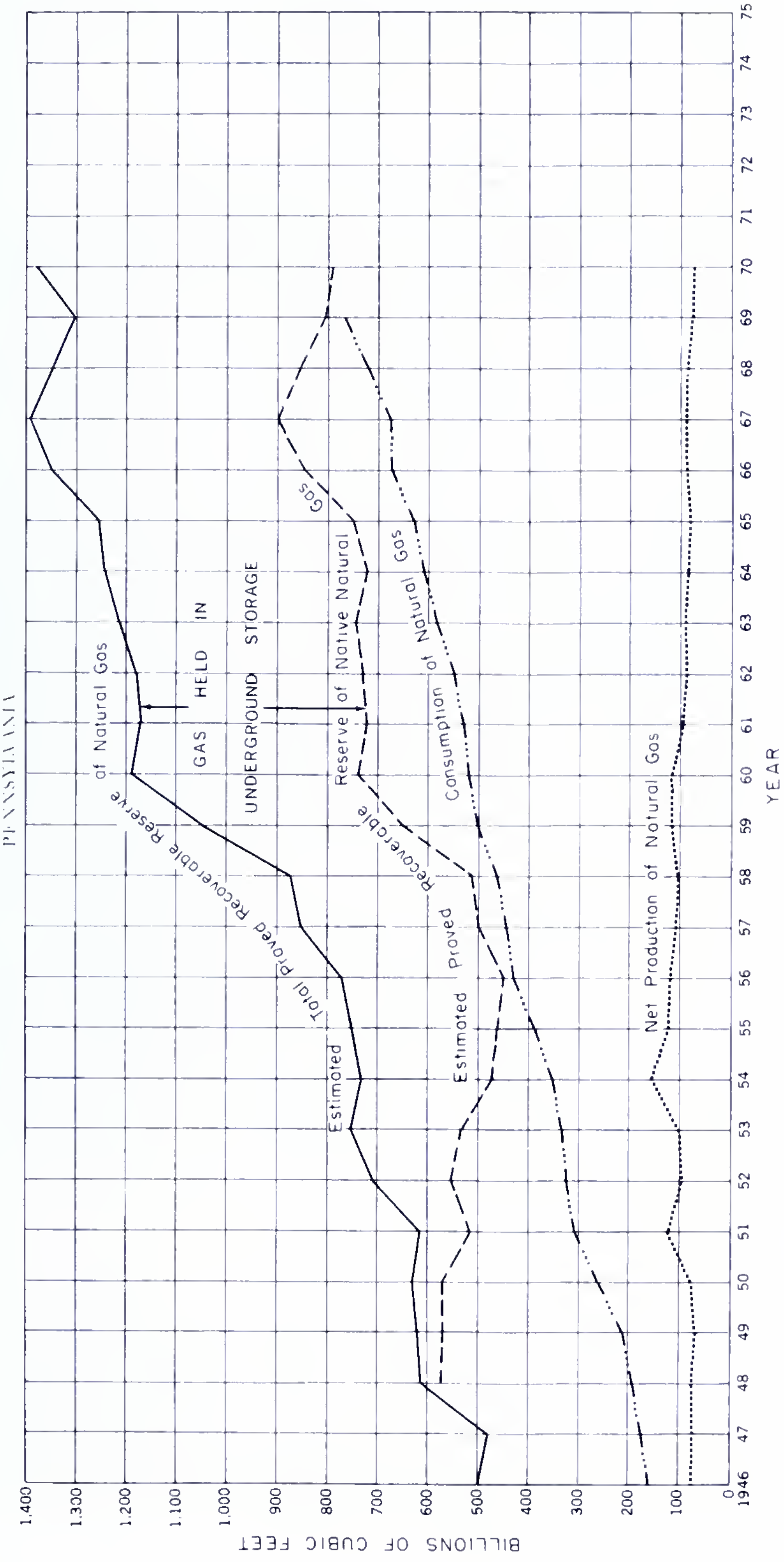


Figure 14. Production, consumption, and reserves of natural gas in Pennsylvania.

and operational monitoring, and (3) a regional survey of potential disposal reservoirs within the Commonwealth of Pennsylvania. The study should be published in 1971. See Table 14 for a listing of subsurface disposal projects.

Secondary and Tertiary Oil Recovery Projects

There were 48 water or gas injection wells completed during the year. In McKean County, 84 oil wells were completed, most of them within secondary recovery projects. The secondary recovery projects in the Commonwealth continued to produce about 71 percent of the crude oil produced annually in Pennsylvania with 56 percent of the total produced from the waterfloods in McKean County.

The Maraflood Pilot Project in the Bradford field, McKean County that has been in operation for over three years has been expanded to a 50 acre project with two Pennsylvania refining companies as partners in the operation. A third Pennsylvania refiner has started another Maraflood project in the First Venango sand in the Grand Valley-Goodwill Hill Field of Warren County. The project will flood about 30 acres of the First Venango sand. Water will be used as part of the flooding medium in this area where previously only gas was injected as a driving force. The project wells are currently being drilled and cored.

Trends in Industry Activity in Pennsylvania

In Progress Report 181, the Pennsylvania Geological Survey initiated the practice of graphically presenting trends in exploration and development during the year. Figure 15 shows these trends for various categories of industry activity in 1970. This figure can be compared with Figure 11 of Progress Report 181, which presents the same data for 1969.

Oil and Gas Prices

Crude oil prices during the year are shown in Table 15. The weighted average price for all natural gas in Pennsylvania was $0.2651 per Mcf during 1970. Although some areas in the Commonwealth had price increases, a statewide increase did not materialize. Due to the shortage of natural gas and the increased cost of finding new natural gas reserves, the price of gas is trending upward. A substantial increase in the price of natural gas is predicted for1971.

Table 14. Subsurface Disposal Projects in Pennsylvania*

			Disposal Horizon				Initial Completion				
Project and Operator	*15-Minute Quadrangle, Section Survey Map No.*	*County*	*Depth (feet)*	*Formation*	*General Rock Type*	*Type of Waste*	*Injection Rate (GPM)*	*Injection** Pressure (psi)*	*Date*	*Status*	*Notes*
Aliquippa Jones & Laughlin Steel Corporation	Sewickley D, #2 (Deep)	Beaver	open 4585-4635	Upper Devonian Onondaga Oriskany Helderberg	Shales Chert Sandstone Limestone	Steel Mill Pickle Liquor	100	2800-3500	1/1966	Shut down 12/2/70 to replace surface tubing.	
Colerain Township Gulf Research & Development	Clearville A, #33 (Deep)	Bedford	545-563	Bellefonte	Dolomite	Drilling Mud	*	1000-1300	12/1964	Plugged and Abandoned 6/69	*Periodic injections amounted to 70,350 gallons cumulative.
Petrolia Borough Kopper Co., Inc. #1	Foxburg G, #64 (Shallow)	Butler	1827-1837 1907 2044 2160-2170	Warren First Warren Second Queen "Speechley"	Siltstone Siltstone Siltstone Sandstone	Organic Chemical Liquors: Sulfite, Sulphates, Phenolics				Pending Completion	
Franklin Borough Bethlehem Steel Co.	Johnstown E, #3 (Shallow)	Cambria	570-835	Big Injun	Sandstone	Weak Ammonia Liquor			1/1966	Abandoned	Inadequate reservoir on testing.
Erie Hammermill Paper Company #1	Erie F, #109 (Deep)	Erie	1610-1688	Bass Island	Dolomite	Spent Sulfite Pulping Liquor	189	1100	11/1965	Active	
Erie Hammermill Paper Company #2	Erie F, #110 (Deep)	Erie	1658-1732 5100-5972*	Bass Island Gatesburg	Dolomite Sandstone	Spent Sulfite Pulping Liquor	600-800	1100	9/1965	Shut-in *	*Gatesburg tested, not used for disposal.

Table 14. Continued.

			Disposal Horizon				Initial Completion				
Project and Operator	15-Minute Quadrangle, Section Survey Map No.	County	Depth (feet)	Formation	General Rock Type	Type of Waste	Injection Rate (GPM)	Injection** Pressure (psi)	Date	Status	Notes
Erie Hammermill Paper Company #3	Erie F, #113 (Deep)	Erie	1586-1737	Bass Island	Dolomite	Spent Sulfite Pulping Liquor	460	1170	8/1968	Active	
W. Bethlehem Township Bethlehem Steel Company	Amity H, #86 (Shallow)	Washington	1472-1508	"Salt"	Sandstone	Acid Mine Water			2/1966	Abandoned	Inadequately developed reservoir.

* Data from the Department of Environmental Resources, Bureau of Sanitary Engineering.

** Gauge Pressure.

Table 15. Crude oil prices per barrel, Pennsylvania 1970.

		Pennsylvania Grade Crude		
	Bradford District	*Middle District*		*Southwestern District*
Jan. 1 to Dec. 31, 1970	$4.63	Pennzoil United, Inc.	$4.19	$3.92
		Quaker State Oil	$4.35	
		Corning Grade Crude		
Jan. 1 to Nov. 22, 1970		$2.97	Erie and Crawford Counties	
Nov. 23 to Dec. 31, 1970		$3.22		

Land Sales

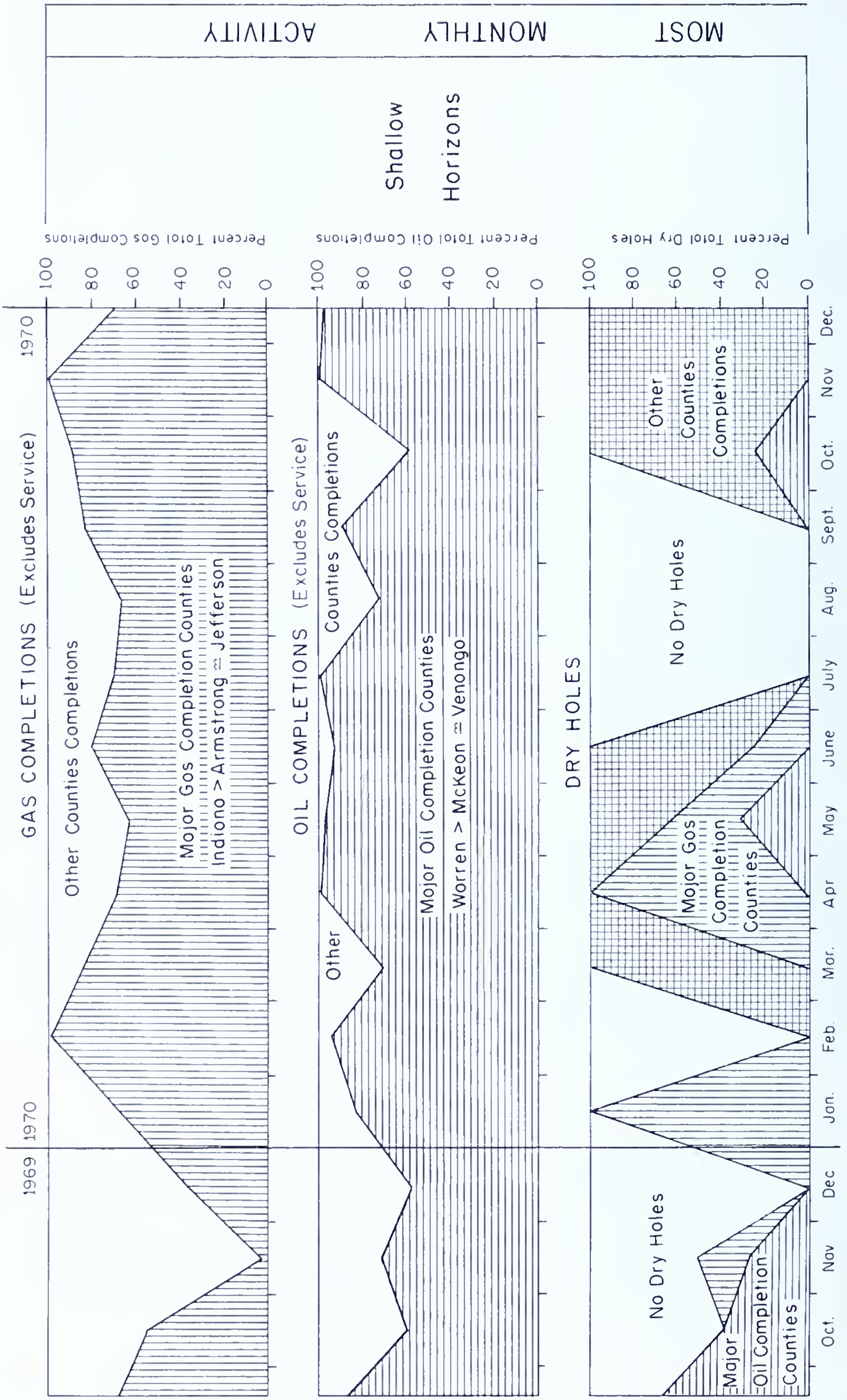
No new tracts were leased by the Pennsylvania Game Commission during the year. At the end of 1970, the Commission had 27 active leases totaling 12,727.5 acres. Thirty-nine wells were producing on 20 of these leases. Two wells were drilled on Game Commission lands during the year in Jefferson County. Both wells were completed as producing gas wells.

Through competitive bidding, 5,165 acres in Tioga County and 5,294 acres in Somerset County of State Forest lands were leased during 1970. The total bonus or first year rental received for these tracts was $37,211.52. After the first year, the Department will receive $1.00 per acre year rental and, if any well is successful, royalties equal to ⅛ or better of all production.

At the end of 1970 there were 126,152 acres of State Forest lands under lease for oil and gas exploration and development including 1,100 acres of mineral rights acquired in Elk County during the year and 59,109 acres in gas storage. Acreage surrendered during the year was in Lake Erie where the bulk of the surrendered acreage is located and in Cameron and Potter counties. The total rental and royalty payments received relative to oil and gas exploration and development on State Forest lands for 1970 amounted to $351,631.33.

Geophysical Activity

There were no gravity or magnetometer surveys reported in Pennsylvania during 1970. Seismic evalution, however, increased from 39 crew-weeks in 1969, to 45 crew-weeks this past year. This activity was centered in Bedford, Blair, Cambria, Centre, Clarion, Clearfield, Crawford, Indiana, Jefferson, Somerset, and Venango counties. A third of the activity was in the Clarion, Crawford, and Venango county area.


MOST MONTHLY ACTIVITY
Shallow Horizons
GAS COMPLETIONS (Excludes Service)
Other Counties Completions
Major Gas Completion Counties
Indiana > Armstrong ≃ Jefferson
Percent Total Gas Completions
OIL COMPLETIONS (Excludes Service)
Other Counties Completions
Major Oil Completion Counties
Warren > McKean ≃ Venango
Percent Total Oil Completions
DRY HOLES
No Dry Holes
Other Counties Completions
Major Gas Completion Counties
Major Oil Completion Counties
Percent Total Dry Holes
100
80
60
40
20
0
1969
1970
Oct.
Nov
Dec
Jan.
Feb.
Mar.
Apr
May
June
July
Aug.
Sept.
Oct.
Nov
Dec.

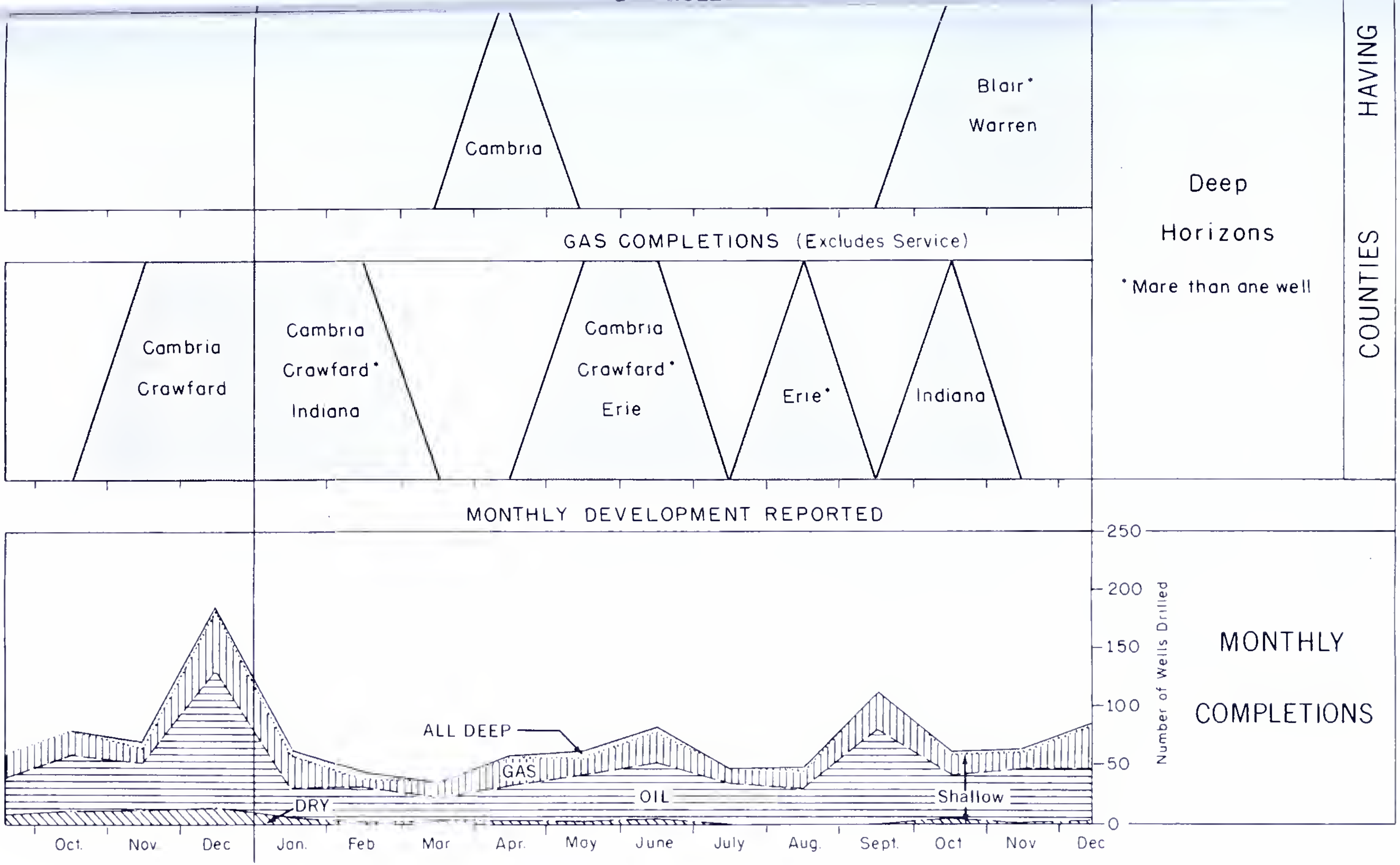


Figure 15. Pennsylvania oil and gas developments—where and when.

Pool Unitization

At the year's end, an application by Kewanee Oil Company was pending to add a 640 acre tract to the northwest end of the Burley Pool unit, Cambria County.

INDUSTRY RELATED ACTIVITIES

Subsurface data is available from the Survey in connection with current projects. The progress made on pertinent Survey projects is outlined below.

Subsurface Base Maps

Paper prints of the well location base maps with superimposed field outline are available. Each base (scale 1: 62,500) comprises the area of four 15 minute topographic quadrangles and locates all post Oil and Gas Law shallow wells and all deep wells of record, as described in Progress Report 177. Figure 16 indexes available base maps. Orders for these maps are to be sent to the Pennsylvania Bureau of Publications, 10th and Market Streets, Harrisburg, Pennsylvania 17125. The available base maps are:

Designation	*Quadrangles Encompassed by Mapped Area*
Map 16	Corry, Tidioute, Titusville, Youngsville
Map 17	Kane, Kinzua, Sheffield, Warren
Map 18	Clarion, Foxburg, Oil City, Tionesta
Map 19	Brookville, DuBois, Hallton, Marienville
Map 21	Butler, New Kensington, Sewickley, Zelienople
Map 22	Elders Ridge, Freeport, Kittanning, Rural Valley
Map 23	Barnesboro, Indiana, Punxsutawney, Smicksburg
Map 24	Connellsville, Donegal, Greensburg, Latrobe
Map 25	Amity, Brownsville, Carnegie, Pittsburgh
Map 26	Franklin, Hilliards, Mercer, Stoneboro
Map 28	Neshannock, Shenango, plus Kinsman and Youngstown in Pennsylvania
Map 29	Beaver, New Castle, plus Columbiana and Wellsville in Pennsylvania
Map 30	Burgettstown, Claysville, plus Steubenville and Wheeling in Pennsylvania

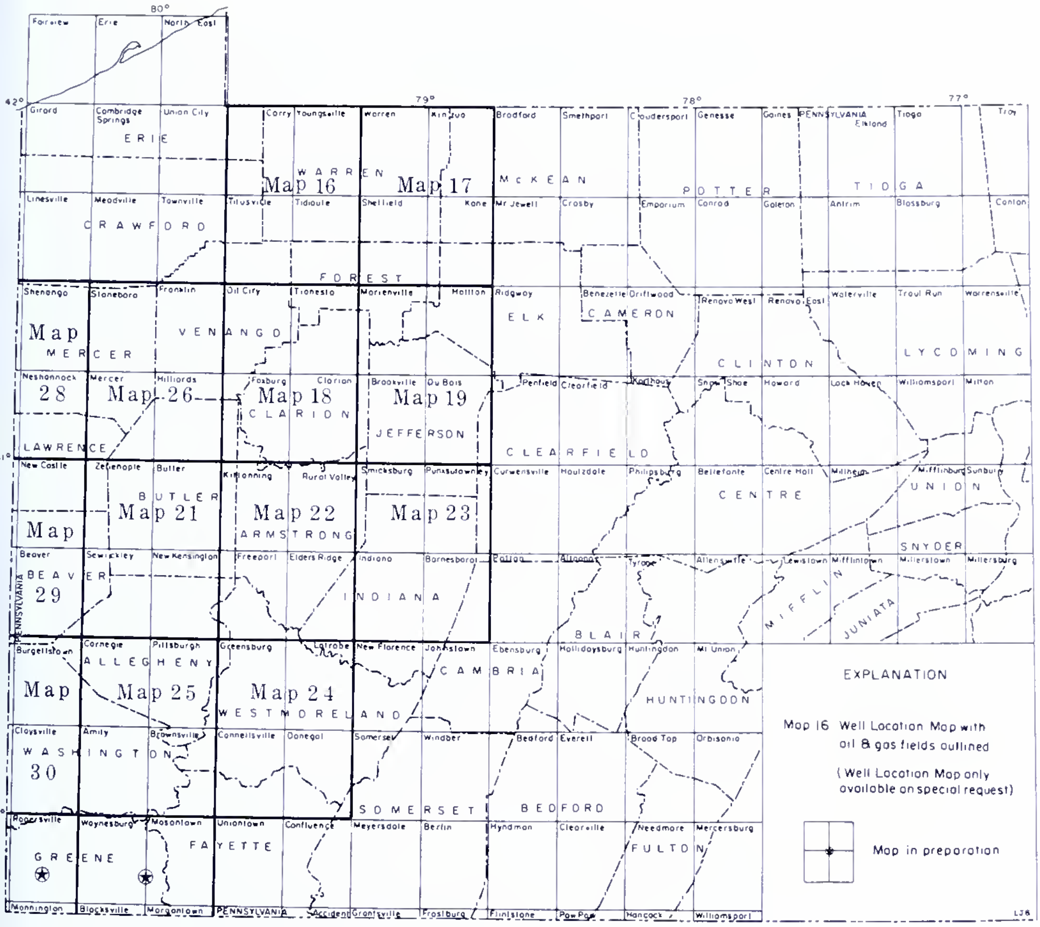


Figure 16. Index of available base maps showing shallow and deep well locations

Regional Correlation Sections

Surface to Middle Devonian Economic Stratigraphy: Part I by D. R. Kelley and W. R. Wagner has been completed and will be published late in 1971 or early in 1972. The publication will contain eight gamma-ray log cross-sections (vertical scale 1″ = 100′) which extend across the Plateau of western Pennsylvania. The cross sections divide the stratigraphic column from the ground surface to and including the Upper Devonian oil and gas sands into 10 Zones and 21 Units. Marked on each gamma-ray log are all reported occurrences of mineral deposits, fuels (oil, gas, coal), and water.

Preparation of a series of Tully (Middle Devonian) to Queenston (Upper Ordovician) regional subsurface correlation sections across western Pennsylvania is in progress. The purpose of these sections is to delineate producing and potential oil and gas zones, occurrences of economically valuable minerals, and general subsurface facies changes and to standardize correlations in this interval. It is expected these sections will be completed in 1971 and may be published in 1972.

Borehole Temperature Compilations

Many borehole temperature measurements have been compiled from geophysical/mechanical well logs for the Pennsylvania portion of the AAPG research project, *Geothermal Survey of North America*. These data and their location are on open file at the Pittsburgh office of the Pennsylvania Geological Survey.

PART III. SUMMARIZED RECORDS OF DEEP WELLS REPORTED IN 1970

Please refer to the previous section on "Basis for Statistics" (Part II) and note that all reports of oil and gas industry activity within the Commonwealth are based on official reports received from the Office of the Deputy Secretary, Oil and Gas, Department of Environmental Resources, the regulatory agency for Oil and Gas Laws, within the calendar year.

The information in the following tables has been compiled mainly from drillers' logs and location plats received from the Office of the Deputy Secretary, Oil and Gas. Other sources are the commercial scout information service, Petroleum Information Corporation (PI), geophysical logs received by the Pennsylvania Geological Survey and personal communications with oil and gas operators. The identification numbers in Table 16 refer only to well location numbers on Figure 9 of this report. The more significant numbers are the permit numbers by which the wells are filed with the Office of the Deputy Secretary, Oil and Gas and the more exclusive and specific quadrangle numbers by which the Survey files the wells and locates them on 15 minute quadrangle maps.

An asterisk preceding a certain depth figure indicates that the indicated formation top has been picked from a geophysical log. A depth figure without asterisk means that the formation top is from the drillers' log or PI.

MAP NUMBER	41	37		38	39	36				
COUNTY Permit Number	Armstrong 1272	Armstrong 1201	Beaver 28	Blair 7	Blair 6	Butler 530-00	Cambria 22	Cambria 21	Cambria 19	Cambria 16
NAME OF WELL	Canterbury Coal RR-1	Nellie C. Martin 1-4634	F. Waxenfelter 1 (C-6)	Fred E. Conrad 1-4652	Ivory Weldon 1-4625	Albert M. Rozic 2	Bakerton Rod & Gun Club 1-4653	H. A. Farabaugh 1-4612	Patele Coal Co. 1	Shero 1
OPERATOR	Pennzoil United	Peoples Natural Gas Co.	Columbia Gas Co.	Peoples Natural Gas Co.	Peoples Natural Gas Co.	Albert M. Rozic	Peoples Natural Gas Co.	Peoples Natural Gas Co.	Fairman Drilling Co.	Kewanee Oil Co.
TOWNSHIP	Kiskiminetas	Wayne	South Beaver	Snyder	Antis	Connoquenessing	West Carroll	Blacklick	Blacklick	West Carroll
QUADRANGLE	Elders Ridge D42	Rural Valley E4	Beaver A8	Tyrone A1	Altoona E1	Butler D1	Patton D5	Barnesboro I20	Johnstown B13	Patton 03
LATITUDE	25,400 ft. S 40°40'	11,500 ft. S 40°55'	750 ft. S 40°45'	3,750 ft. S 40°45'	15,800 ft. S 40°40'	19,150 ft. S 40°55'	24,700 ft. S 40°40'	23,250 ft. S 40°35'	2,450 ft. S 40°30'	16,500 ft. S 40°40'
LONGITUDE	10,080 ft. W 79°25'	4,000 ft. W 79°20'	10,300 ft. W 80°25'	1,500 ft. W 78°10'	8,350 ft. W 78°20'	22,100 ft. W 79°55'	19,650 ft. W 78°40'	15,425 ft. W 78°45'	4,250 ft. W 78°50'	13,600 ft. W 78°40'
DATE COMPLETED	12-14-70	10-23-70	7-2-70	9-17-70	8-12-70	10-31-69	11-10-70	7-11-70	3-30-70	12-19-69
ELEVATION	1293 KB	1478 KB	998 GL	1206 KB	1484 KB	1280 GL	1941 KB	2103 KB	2020 KB	2044 GL
TULLY	6485-6605	5943-	4253-4260	*2138-2183	*4676-4705	5197-5208?	7372-	*7331-7353	*7679-7702	*7382-7406
ONONDAGA LIMESTONE	7035-7042	6380-6409	4410-4426	*3226-3274	*5674-5730	5512-5420	8198-8215	*8237-8256	*8514-8528	*8212-8230
ONONDAGA CHERT	7042-7194	6409-6502	4426-4613			5420-5631	8215-8290	*8256-8334	*8528-8614	*8230-8302
ORISKANY	7194-7210	6502-6511	4613-	*3274-3300	*5730-5752	5631-	8290-8305	*8334-8356	*8614-8661	*8302-8340
HELDERBERG	7210-	6511-6640		*3300-	*5752-		8305-	*8356-	*8661-	*8340-
Keyser-Bass Islands SALINA		6640-6710 6710-								
GUELPH-LOCKPORT										
CLINTON										
MEDINA										
QUEENSTON										
TOTAL DEPTH	7235	15574	4690	3347	5821	5636	8338	8390	8691	8360
DEEPEST FORMATION REACHED	Helderberg	Elbrook	Oriskany	Helderberg	Helderberg	Oriskany	Helderberg	Helderberg	Helderberg	Helderberg
RESULT	2,170 Mcf from Don-Oor 7047-7210 3950 psi/5 days Deeper Pool Discovery Roaring Run Pool	500 Mcf Nat. from Pfs 6420-6510, 1,100 Mcf AF 3325 psi/7 days Deeper Pool Disc. Snydervillle Pool	HFW in Oor South Beaver Gas Storage	SG Oor 7 Mcf AF 75 psi/18 hrs. Abandoned	SG Oor 80 Mcf AF 450 psi/12 hrs. Abandoned	OWDD SG Oor est. 2 Mcf Recomp. as Shallow Gas Well	10.9 Mcf Don-Oor 520 Mcf AF 3590 psi/20 days Burley Pool	231 Mcf Oon-Oor 2,100 Mcf AF 3850 psi/48 hrs. Pindleton Pool	NSG Oon-Oor 30 Mcf + SWAF Abandoned Pindleton Pool	250 Mcf Oon-Oor 2,200 Mcf AF 3812 psi/51 hrs. Burley Pool

Table 16. Continued.

MAP NUMBER										
COUNTY Permit Number	Cambria 20	Clinton 75	Clinton 78	Clinton 82	Clinton 81	Clinton 80	Crawford 361	Crawford 357	Crawford 331	Crawford 366
NAME OF WELL	G. H. Sloan 1-4635	Pa. Dept. F & W Tract 4 5	Pa. Dept. F & W Tract 6 10	Pa. Dept. F & W Tract 15 1	Pa. Dept. F & W Tract 15 3	Pa. Dept. F & W Tract 15 12	Charles I. Field 1	Frank M. Field 1	M. E. Jamison 2	J. W. Johnston 1
OPERATOR	Peoples Natural Gas Co.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Flanigan Brothers	Flanigan Brothers	James Drilling Co.	Flanigan Brothers
TOWNSHIP	West Carroll	East Keating	Leidy	Chapman	Chapman	Chapman	Spring	Spring	Summerhill	Spring
QUADRANGLE	Patton D4	Renovo West D206	Renovo West B205	Renovo West C204	Renovo East A19	Renovo East A20	Girard 1407	Girard 1403	Linesville C36	Girard 1414
LATITUDE	22,200 ft. S 40°40'	12,650 ft. S 41°25'	27,875 ft. S 41°30'	12,100 ft. S 41°30'	12,750 ft. S 41°30'	9,100 ft. S 41°30'	20,700 ft. S 41°50'	22,875 ft. S 41°50'	1,325 ft. S 41°45'	16,525 ft. S 41°50'
LONGITUDE	17,500 ft. W 78°40'	12,900 ft. W 77°55'	10,850 ft. W 77°50'	200 ft. W 77°45'	20,850 ft. W 77°40'	19,150 ft. W 77°40'	13,300 ft. W 80°15'	11,350 ft. W 80°15'	18,350 ft. W 80°15'	12,500 ft. W 80°15'
DATE COMPLETED	6-6-70	11-14-70	8-3-70	9-28-70	10-19-70	10-23-70	11-13-69	10-31-69	12-23-69	2-7-70
ELEVATION	1977 KB	1729 GL	1686 GL	1684 GL	1759 GL	1788 GL	1207 DF	1180 GL	1305 GL	1135 GL
TULLY	7310	5641-5765	5502-5611	5724-5822	5821-5916	5814-5911				
ONONDAGA LIMESTONE	8120-8160	6423-6442	6298-6315	6560-6579	6648-6670	6663-6684	2555-2750	2552-2728	2580-2770	2410-2624
ONONDAGA CHERT	8160-8228									
ORISKANY	8228-8244	6442-6454	6315-6343	6579-6618	6670-6708	6684-6725	2750-2755	2728 (horiz)	2770-2780	2624-2630
HELDERBERG	8244-	6454-	6343-	6618-	6708-	6725-				
SALINA							3100-3430	3078-3410		2900-3350
GUELPH - LOCKPORT Black Water							3430-3720 3640	3410-3702 3570	3465-3850 3590	3350-3595 3504
CLINTON IRONDEQUOIT							3782-3791	3772-3791	3930-3940	3682-3692
MEDINA							3850-3918	3840-3880	3975-4000	3788-3803
QUEENSTON							3954-	3918-	4110-	
TOTAL DEPTH	8300	6565	6434	6715	6800	6819	3995	3935	4163	3997
DEEPEST FORMATION REACHED	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Queenston	Queenston	Queenston	Medina
RESULT	300 Mcf Don-Dor 9,200 Mcf AF 3925 psi/74 hrs.	15,452 Mcf Don-Dor 25,856 Mcf AF 3780 psi/48 hrs.	87,146 Mcf Nat. 3460 psi/ 48 hrs Leidy Gas	7,341 Mcf Nat. 2130 psi/48 hrs. Leidy Gas	15,452 Mcf Nat. 3040 psi/48 hrs. Leidy Gas	8,341 Mcf Nat. 3820 psi/48 hrs. Leidy Gas	50 Mcf Nat. Smed. 1,000 Mcf AF 1125 psi/48 hrs.	40 Mcf Nat. Smed. 900 Mcf AF 1125 psi/48 hrs. Indian Springs	NSG Nat. Smed. 1,100 Mcf AF 1100 psi/3 days Indian Springs	10 Mcf Nat. Smed. 800 Mcf AF 1140 psi/48 hrs. Indian Springs

MAP NUMBER										
COUNTY Permit Number	Crawford 243	Crawford 236	Crawford 368	Crawford 244	Crawford 355	Crawford 360	Crawford 359	Crawford 332	Crawford 358	Crawford 367
NAME OF WELL	J. W. Joslin 1	R. T. Knapp 1	J. R. Lawrence 1	Cary L. Main 1	Daniel Ryner 1	E. H. Spaid 1	E. H. Spaid 2	C. R. Wiard 2	R. J. Welcheck 1	R. J. Welcheck 2
OPERATOR	James Drilling Co.	Stanley J. Kerpoe	James Drilling Co.	James Drilling Co.	James Drilling Co.	Flanigan Brothers	Flanigan Brothers	James Drilling Co.	Flanigan Brothers	Flanigan Brothers
TOWNSHIP	Summerhill	Spring	Spring	Spring	Spring	Spring	Spring	Spring	Spring	Spring
QUADRANGLE	Linesville C34	Girard 1391	Girard 1408	Linesville 835	Girard 1401	Girard 1406	Girard 1405	Girard 1402	Girard 1404	Girard 1413
LATITUDE	1,925 ft. S 41°45'	23,350 ft. S 41°50'	27,400 ft. S 41°50'	550 ft. S 41°45'	19,725 ft. S 41°50'	20,550 ft. S 41°50'	19,200 ft. S 41°50'	19,475 ft. S 41°50'	18,450 ft. S 41°50'	18,275 ft. S 41°50'
LONGITUDE	19,950 ft. W 80°15'	14,950 ft. W 80°15'	20,800 ft. W 80°15'	475 ft. W 80°20'	20,075 ft. W 80°15'	10,650 ft. W 80°15'	14,000 ft. W 80°15'	18,400 ft. W 80°15'	11,575 ft. W 80°15'	9,000 ft. W 80°15'
DATE COMPLETED	12-30-68	11-25-68	2-2-70	12-24-69	11-20-69	11-27-69	12-17-69	12-2-69	1-20-70	3-9-70
ELEVATION	1325 DF	1212 GL	1250 GL	1210 GL	1250 GL	1160 GL	1210 DF	1242 GL	1170 DF	1155 KB
TULLY	2529-2566	2419-2460								
ONONDAGA LIMESTONE CHERT	2695-2889	2595-2812	2570-2750	2550-2740	2560-2750	2505-2705	2514-2720	2550-2730	2513-2715	2490-2692
DRISKANY			2750-2760	2740-2750	2750-2760	2705-2710	2720-2725	2730-2740	2715-2718	2692-2698
HELDERBERG									2958-3417	3039-3370
SALINA	3153-3519	3195-3412	3000-3420			2955-3410	2975-3447			
GUELPH - LOCKPORT Black Water	3519-3845	3412-3725	3505-3750 3580	3410-3724 3572	3440-3720 3580	3410-3649 3605	3447-3687 3595	3462-3720 3550	3417-3645 3615	3370-3658 3597
CLINTON IRONDEQUOIT	3952-3960	3820-3831	3846-3850	3810-3820	3800-3810	3739-3749	3779-3788	3800-3810	3714-3723	3712-3722
MEDINA	4000-4095	3870-4030	3878-4010	3844-3940	3870-3930	3765-3864	3876-3950	3833-3930	3785-3885	3740-3835
QUEENSTON	4128-	4035-	4064-	4030-	4000-	3912-	3985-	4015-	3920-	3870-
TOTAL DEPTH	4156	4070	4094	4079	4060	3975	3995	4052	3950	3940
DEEPEST FORMATION REACHED	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston	Queenston
RESULT	NSG Nat. Smed. 1,125 Mcf AF 1220 psi/3 days Indian Springs Pool	NSG Nat. Smed. 4,000 Mcf AF 1225 psi/3 days Indian Springs Pool	NSG Nat. Smed. 750 Mcf AF 1175 psi/3 days Indian Springs Pool	NSG Nat. Smed. 1,200 Mcf AF 1125 psi/3 days Indian Springs Pool	NSG Nat. Smed. 1,000 Mcf AF 1150 psi/3 days Indian Springs Pool	1,000 Mcf Nat. Smed., 3000 Mcf AF 1150 psi/48 hrs. Indian Springs Pool	10 Mcf Smed. 800 Mcf AF 1125 psi/48 hrs. Indian Springs Pool	NSG Nat. Smed. 2,700 Mcf AF 1125 psi/3 days Indian Springs Pool	10 Mcf Nat. Smed. 1,000 Mcf AF 1125 psi/48 hrs. Indian Springs Pool	1,000 Mcf Nat. Smed., 1000 Mcf AF 1140 psi/3 days Indian Springs Pool

Table 16. Continued.

MAP NUMBER						40				
COUNTY Permit Number	Erie 315	Erie 319	Erie 315	Indiana 1401	Indiana 1448	Indiana 1330	Indiana 1476	McKean 3237	McKean 4087	Potter 345
NAME OF WELL	J & M Freeman 1	Philip Patten 1	Donald Robson 1	Clearfield Bitum. Coal 1	James A. Gray 1	R. Hanwell, Jr. 1	Uriah Sides 1	Knox & South Looker 1	Mallory 3	N. J. Acker 1
OPERATOR	J. Sterling McCluskey	J. Sterling McCluskey	J. Sterling McCluskey	Felmont Oil Corp.	Felmont Oil Corp.	Felmont Oil Corp.	Felmont Oil Corp.	Hungiville & Satterwhite	George L. Kroh	Consol. Gas Supply Corp.
TOWNSHIP	Conneaut	Conneaut	Conneaut	Pine	Green	Green	Pine	Otto	Foster	Genesee
QUADRANGLE	Girard 0411	Girard 0410	Girard 0409	Barnesboro E19	Barnesboro E21	Barnesboro E18	Barnesboro E23	Bradford C8	Bradford A9	Genesee B169
LATITUDE	1,375 ft. S 41°55'	1,675 ft. S 41°55'	2,750 ft. S 41°55'	9,850 ft. S 40°40'	1,150 ft. S 40°40'	5,680 ft. S 40°40'	13,500 ft. S 40°40'	30,250 ft. S 42°00'	1,700 ft. S 42°00'	24,600 ft. S 42°00'
LONGITUDE	14,200 ft. W 80°25'	15,300 ft. W 80°25'	12,000 ft. W 80°25'	8,350 ft. W 78°50'	2,125 ft. W 78°50'	5,100 ft. W 78°50'	11,425 ft. W 78°50'	2,700 ft. W 78°30'	10,500 ft. W 78°40'	4,350 ft. W 77°50'
DATE COMPLETED	7-8-70	7-12-70	4-29-70	8-11-70	9-4-70	12-20-69	12-8-70	4-8-68	3-24-69	10-27-70
ELEVATION	878 KB	875(?) topo	900 est.	1962 RT	2031 RT	1993 RT	1843 RT	1762 DF	2110 DF	1869 GL
TULLY	1605-1616	1610-1620	1635-1645	7196-7217	7431-7454	7291-7310	7162-7181		?4020-4027?	4321-4373
ONONDAGA LIMESTONE	1783-1994	1761-1990	1817-2027	7942-7959	8182-8198	8030-8050	7925-7942	4514-4585	4380-4453	4943-4972
ONONDAGA CHERT				7959-8053	8198-8292	8050-8144	7942-8039			
DRISKANY	1990-2006	1990-2006	2027-2035	8053-8080	8292-8309	8144-8167	8039-8060	4585-4586	4453-4472	4972-4996
HELDERBERG				8080-	8309-	8167-	8060-	4586-		4996-
SALINA										
GUELPH-LOCKPORT Black Water	2683-2810	2658-2800	2690-2845							
CLINTON IRONDEQUOIT	2995-3005	2981-2992	3037-3046							
MEDINA	3052-3144	3027-3096	3070-3153							
QUEENSTON		3181-	3228-							
TOTAL DEPTH	3200	3220	3278	8113	8352	8199	8098	4655	4472	5074
DEEPEST FORMATION REACHED	Whirlpool(?)	Queenston	Queenston	Helderberg	Helderberg	Helderberg	Helderberg	Bass Islands	Oriskany	Helderberg
RESULT	3375 Mcf AF Smed. 1100 psi/12 hrs. Bushnell-	2,000 Mcf Nat. Smed. 4,800 Mcf AF	3250 Mcf AF Smed. 1000 psi/60 hrs.	7.5 Mcf Nat. Don-Dor 9950 Mcf AF 4250 psi/17 hrs.	220 Mcf Nat. Don-Dor 3852 Mcf AF 4238 psi/65 hrs.	38 Mcf Nat. Don-Dor 6150 Mcf AF 4261 psi/13 days	60 Mcf Nat. Don-Dor 8300 Mcf AF 4211 psi/6 days	SG in U. Devonian Comp. as shallow gas well. reviously rept'd in PR173. Oil &	202 Mcf Nat. Dor. 1460 psi/48 hrs. Mallory Pool	9773 Mcf Nat. Don-Dor 54,703 Mcf AF 2060 psi/72 hrs. Ellisburg

MAP NUMBER										
COUNTY Permit Number	Potter 327	Potter 339	Potter 351	Potter 302	Potter 303	Potter 344	Potter 330	Potter 328	Potter 334	Potter 336
NAME OF WELL	M. L. Haskell 1	M. L. Haskell 2	M. H. Holbert 1	Donald James 1	E. S. James Tract 1 1	T. H. James 2	Pa. Dept. F & W Tract 16 5	Pa. Dept. F & W Tract 16 10	Pa. Dept. F & W Tract 16 11	Pa. Dept. F & W Tract 16 13
OPERATOR	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.
TOWNSHIP	Allegany	Allegany	Bingham	Bingham	Allegany	Genesee	Stewardson	Stewardson	Stewardson	Stewardson
QUADRANGLE	Genesee D162	Genesee D163	Genesee C173	Genesee C159	Genesee E155	Genesee E168	Renovo East A18	Renovo East A16	Renovo East A17	Galeton G46
LATITUDE	7,400 ft. S 41°55'	5,200 ft. S 41°55'	14,750 ft. S 42°00'	17,950 ft. S 42°00'	1,850 ft. S 41°55'	3,350 ft. S 41°55'	5,475 ft. S 41°30'	7,250 ft. S 41°30'	4,600 ft. S 41°30'	29,375 ft. S 41°35'
LONGITUDE	3,850 ft. W 77°55'	3,550 ft. W 77°55'	8,700 ft. W 77°45'	13,600 ft. W 77°45'	20,900 ft. W 77°50'	20,900 ft. W 77°50'	16,000 ft. W 77°40'	16,550 ft. W 77°40'	18,000 ft. W 77°40'	9,725 ft. W 77°40'
DATE COMPLETED	8-6-70	9-10-70	10-31-70	1-26-70	10-3-69	10-23-70	10-12-70	8-31-70	7-23-70	11-8-70
ELEVATION	2204 GL	2088 GL	2083 GL	1948 GL	2006 GL	2116 GL	1610 GL	1818 GL	1840 GL	1825 GL
TULLY	4684-4730	4547-4593	4549-4594	4402-4473	4397-4450	4527-4573	5593-5684	5838-5933	5877-5972	5676-5761
ONONDAGA LIMESTONE CHERT	5287-5309	5150-5168	5182-5217	5028-5059	5010-5025	5135-5158	6429-6455	6694-6719	6722-6747	6517-6542
ORISKANY	5309-5340	5168-5198	5217-5242	5059-5089	5025-5070	5158-5190	6455-6496	6719-6758	6747-6786	6542-6582
HELDERBERG	5340-	5198-	5242-	5089-	5070-	5190-	6496-	6758-	6786-	6582-
SALINA										
GUELPH-LOCKPORT										
CLINTON										
MEDINA										
QUEENSTON										
TOTAL DEPTH	5425	5280	5370	5158	5135	5277	6600	6837	6865	6678
DEEPEST FORMATION REACHED	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg
RESULT	25,856 Mcf Nat. Dor 1730 psi/72 hrs. Ellisburg Gas Storage	33,074 Mcf Nat. Dor 33,975 Mcf AF 1,824 psi/72 hrs. Ellisburg Gas Storage	6,128 Mcf Nat. Dor 24,426 Mcf AF 1,908 psi/72 hrs. Ellisburg Gas Storage	10,048 Mcf Nat. Dor 19,545 Mcf AF 1,515 psi/14 dys Ellisburg Gas Storage	41,145 Mcf Nat. Dor 1,750 psi/63 hrs. Ellisburg Gas Storage	51,098 Mcf Nat. Dor 2,110 psi/72 hrs. Ellisburg Gas Storage	20,731 Mcf Nat. 71,826 Mcf AF 3,510 psi/48 hrs. Greenlick Gas Storage	4,897 Mcf Nat. 2,500 psi/48 hrs. Greenlick Gas Storage	5,500 Mcf Nat. 3,360 psi/48 hrs Greenlick Gas Storage	11,969 Mcf Nat. 58,308 Mcf AF 3,820 psi/48 hrs. Greenlick Gas Storage

Table 16. Continued.

MAP NUMBER											
COUNTY Permit Number		Potter 338	Potter 333	Potter 326	Potter 316	Potter 348	Potter 346	Potter 342	Potter 357	Potter 350	Potter 360
NAME OF WELL		Pa. Dept. F & W Tract 45 8	Pa. Dept. F & W Tract 58 14	M. C. Sanford (was H. C. James) 2	J. I. Smoker 1	J. I. Smoker 2 (EW-220)	J. I. Smoker 2 (EW-219)	R. J. Steadman 2	J. B. Truax 1	A. E. Vanderhoff 1	West Virginia Paper Company 1
OPERATOR		Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.
TOWNSHIP		Stewardson	Stewardson	Genesee	Genesee	Genesee	Genesee	Genesee	Bingham	Bingham	Allegany
QUADRANGLE		Galeton G45	Galeton G44	Genesee E177	Genesee D154	Genesee E167	Genesee A176	Genesee B164	Genesee C172	Genesee B174	Genesee D171
LATITUDE		26,450 ft. S 41°35'	23,300 ft. S 41°35'	1,200 ft. S 41°55'	900 ft. S 41°55'	1,650 ft. S 41°55'	29,300 ft. S 42°00'	27,600 ft. S 42°00'	19,000 ft. S 42°00'	23,450 ft. S 42°00'	8,100 ft. S 41°55'
LONGITUDE		5,450 ft. W 77°40'	3,900 ft. W 77°40'	18,850 ft. W 79°50'	1,000 ft. W 77°55'	22,300 ft. W 77°50'	1,350 ft. W 77°55'	8,000 ft. W 77°50'	15,000 ft. W 77°45'	23,000 ft. W 77°45'	5,750 ft. W 77°55'
DATE COMPLETED		9-1-70	6-23-70	10-1-70	12-5-69	10-10-70	11-9-70	8-19-70	11-5-70	11-9-70	11-7-70
ELEVATION		1997 GL	1894 GL	2002 GL	2137 GL	2069 GL	2214 GL	2057 GL	1844 GL	2124 GL	2194 GL
TULLY		5845-5932	5815-5880	4390-4438	4584-4657	4486-4531	4698-	4531-4580	4312-4362	4560-4611	4691-4737
ONONDAGA	LIMESTONE	6695-6721	7120-7147	5003-5026	5205-5231	5094-5119	5306-5327	5134-5160	4946-4982	5184-5208	5292-5311
	CHERT										
ORISKANY		6721-6760	7147-7188	5026-5055	5231-5264	5119-5155	5327-5366	5160-5184	4982-5013	5208-5231	5311-5341
HELDERBERG		6760-	7188-	5055-	5264-	5155-	5366-	5184-	5013-	5231-	5341-
SALINA											
GUELPH-LOCKPORT											
CLINTON											
MEDINA											
QUEENSTON											
TOTAL DEPTH		6900	7230	5160	5335	5225	5443	5253	5085	5235	5425
DEEPEST FORMATION REACHED		Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg
RESULT		55,609 Mcf Nat. 2,995 psi/48 hrs.	NS Gas Nat. Abandoned	50,197 Mcf Nat. 2,038 psi/72 hrs.	17,944 Mcf Nat. 49,296 Mcf AF	48,394 Mcf Nat. 2,038 psi/72 hrs.	31,272 Mcf Nat. 2,100 psi/72 hrs.	25,856 Mcf Nat. 1,717 psi/72 hrs.	8,532 Mcf Nat. 36,679 Mcf AF	14,638 Mcf Nat. 36,679 Mcf AF	35,778 Mcf Nat. 36,679 Mcf AF

MAP NUMBER										
COUNTY Permit Number	Potter 363	Potter 365	Potter 304	Potter 343	Potter 364	Potter 300	Potter 315	Potter 340	Potter 347	Potter 317
NAME OF WELL	C. M. Allis 1	W. C. Allis 2	E. K. Burch 1	W. T. Burrell 1	C. C. Carpenter 1	E. O. Dailey 1	Marvin Easton 1 (EW 409)	Marvin Easton 2 (EW 414)	Marvin Easton 1 (EW 416)	G. Gilliland 1
OPERATOR	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.
TOWNSHIP	Genesee	Genesee	Allegany	Genesee	Genesee	Genesee	Genesee	Genesee	Genesee	Genesee
QUADRANGLE	Genesee B180	Genesee B179	Genesee D156	Genesee B165	Genesee B178	Genesee B161	Genesee B158	Genesee B166	Genesee B170	Genesee B157
LATITUDE	27,600 ft. S 42°00'	24,600 ft. S 42°00'	6,100 ft. S 41°55'	25,500 ft. S 42°00'	29,500 ft. S 42°00'	24,250 ft. S 42°00'	28,550 ft. S 42°00'	26,800 ft. S 42°00'	26,150 ft. S 42°00'	26,150 ft. S 42°00'
LONGITUDE	13,900 ft. W 77°50'	13,300 ft. W 77°50'	4,950 ft. W 77°55'	10,600 ft. W 77°50'	11,200 ft. W 77°50'	11,500 ft. W 77°50'	10,450 ft. W 77°50'	6,450 ft. W 77°50'	3,550 ft. W 77°50'	18,600 ft. W 77°50'
DATE COMPLETED	11-19-70	11-19-70	11-19-70	8-17-70	11-17-70	6-27-70	1-9-70	8-19-70	10-22-70	10-15-69
ELEVATION	1984 GL	2242 GL	2182 GL	2177 GL	2242 GL	2224 GL	2173 GL	1919 GL	2040 GL	2017 GL
TULLY	4378-	4699-	4699-	4604-4653	4691-	4685-	4622-4683	4370-4420	4516-4567	4498-4580
ONONDAGA LIMESTONE CHERT	4992-5026	5311-5339	5255-5279	5221-5248	5300-5327	5297-5324	5227-5260	4980-5004	5128-5154	5105-5135
ORISKANY	5026-5055	5339-5374	5279-5306	5248-5265	5327-5353	5324-5353	5260-5287	5004-5029	5154-5176	5135-5175
HELDERBERG	5055-	5374-	5306-	5265-	5353-	5353-	5287-	5029-	5176-	5175-
SALINA										
GUELPH-LOCKPORT										
CLINTON										
MEDINA										
QUEENSTON										
TOTAL DEPTH	5130	5454	5376	5345	5425	5425	5360	5115	5250	5235
DEEPEST FORMATION REACHED	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg	Helderberg
RESULT	54,703 Mcf Nat. Dor 2070 psi/72 hrs. Ellisburg Gas Storage	64,614 Mcf Nat. Dor 2050 psi/72 hrs. Ellisburg Gas Storage	27,667 Mcf Nat. Don-Dor 1620 psi/14 days Ellisburg Gas Storage	46,592 Mcf Nat. Dor-Dh 1788 psi/72 hrs. Ellisburg Gas Storage	51,098 Mcf Nat. Dor 2075 psi/72 hrs. Ellisburg Gas Storage	Junk in hole; no test; Injection well; Ellisburg Gas Storage	28,112 Mcf Nat. Don-Dor 1140 psi/14 days Ellisburg Gas Storage	10,322 Mcf Nat. Don-Dor no test AF 1433 psi/72 hrs. Ellisburg Gas Storage	10,861 Mcf Nat. Dor 37,580 Mcf AF 2020 psi/48 hrs. Ellisburg Gas Storage	63,715 Mcf Nat. Dor 1740 psi/14 days Ellisburg Gas Storage

Table 16. Continued.

MAP NUMBER			35	34						
COUNTY Permit Number	Potter 306	Potter 349	Warren 2693	Warren 2435-R						
NAME OF WELL	F. O. Whitney 2	F. O. Whitney 3	Lot 74 TT-1	Pettigrew (was Anderson) 1						
OPERATOR	Consol. Gas Supply Corp.	Consol. Gas Supply Corp.	Pennzoil United, Inc.	Myrle L. Cady (was T. M. Pettigrew, et.al)						
TOWNSHIP	Bingham	Bingham	Mead (was Kinzua)	Sugar Grove						
QUADRANGLE	Genesee B160	Genesee C175	Warren 114	Youngsville C1						
LATITUDE	24,475 ft. S 42°00'	21,500 ft. S 42°00'	16,425 ft. S 41°50'	1,500 ft. S 42°00'						
LONGITUDE	3,200 ft. W 77°50'	20,900 ft. W 77°45'	6,100 ft. W 79°00'	17,750 ft. W 79°15'						
DATE COMPLETED	6-16-70	11-12-70	11-17-70	5-29-70						
ELEVATION	1985 GL	2072 GL	1960 KB	1360 GL						
TULLY	4427-4499	4526-	4408-4440							
ONONDAGA LIMESTONE / CHERT	5050-5070	5149-5176	4672-4725	3040-3174						
ORISKANY	5070-5100	5176-5205	4725-4746	3186-3194?						
HELDERBERG BASSISLANDS	5100-	5205-	4746-4818	3210?-3249						
SALINA			4818-	3249-3820						
GUELPH-LOCKPORT			5620-	3820-4090						
CLINTON				4172-4210						
MEDINA				4250-4378						
QUEENSTON										
TOTAL DEPTH	5170	5275	5683	CO to 4384 OTD - 4430						
DEEPEST FORMATION REACHED	Helderberg	Helderberg	Lockport	Medina						
RESULT	13,820 Mcf Nat. 14,636 Mcf AF Gas Storage	8,667 Mcf Nat. 16,923 Mcf AF Gas Storage	NSOG Abandoned	OWWO, was O&A 2 Mcf Nat Smed in Deeper Pool Disc						